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SCIENCE, ENGINEERING, AND HUMANITIES DOCTORATES IN THE UNITED STATES

1981 PROFILE

Based on the
1981 Survey of
Science, Engineering, and Humanities Doctorates

The Survey of Doctorate Recipients is conducted by
the National Research Council with the support of
the National Science Foundation, the National Endowment for
the Humanities, the National Institutes of Health, and the
Department of Energy

Betty D. Maxfield
Project Director

Office of Scientific and Engineering Personnel
NATIONAL RESEARCH COUNCIL

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NOTICE: This report is based on the 1981 Survey of Doctorate Recipients (SDR), a project approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The survey project is part of the program of the Office of Scientific and Engineering Personnel.

The Office of Scientific and Engineering Personnel has reviewed this report in accordance with procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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ACKNOWLEDGMENTS

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The Survey of Doctorate Recipients (SDR) project is under the administrative supervision of Betty D. Maxfield. Susan Henn, Research Associate, was primarily responsible for programming the summary statistics included in the report and drafting the technical appendices. Betty Maxfield drafted the report and was assisted by Deborah Gangloff, technical editor, in making final emendations. Doris Pogowski and Eileen Milner of the Supporting Services Section supervised the special follow-up mailings and the coding of the returned questionnaires. George Boyce of the Data Processing Section performed the data processing activities associated with the survey.

J. James Brown of the National Science Foundation's Division of Science Resources Studies served as the responsible staff officer at the Foundation and, with Arnita Jones of the National Endowment for the Humanities and George Bowden of the National Institutes of Health, provided helpful advice to the Survey of Doctorate Recipients' staff.

Many members of the scientific and engineering communities provided assistance in obtaining current mailing addresses for the survey sample. They include representatives of the professional societies, graduate deans, academic chairmen and other university officials.

Finally, the scientists, engineers, and humanists who responded to this survey deserve thanks for their cooperation. It was their responsiveness that made this report possible.

Betty D. Maxfield
Director
Survey of Doctorate Recipients

FOR FURTHER INFORMATION

Further analyses of the 1981 survey data will be done in 1982, and additional reports will be forthcoming. Meanwhile, questions may be directed to:

Survey of Doctorate Recipients
National Research Council
2101 Constitution Avenue
Washington, D.C. 20418

Other reports of the National Research Council derived from the Survey of Doctorate Recipients in 1979, 1977, 1975, and 1973 are as follows and may be obtained from the Project Office at the above address:

"Employment of Minority Ph.D.s: Changes over Time." (1981)

"Science, Engineering, and Humanities Doctorates in the United States: 1979 Profile." (1980)

"Employment of Humanities Ph.D.s: A Departure from Traditional Jobs." (1980)

"Ph.D.s in Business and Industry." (1979)

"Career Patterns of Doctoral Scientists and Engineers: 1973-1977." (1979)

"The Effects of Nonresponse Bias on the Results of the 1975 Survey of Doctoral Scientists and Engineers" (1979)

"Science, Engineering, and Humanities Doctorates in the United States: 1977 Profile." (1978)

"An Evaluation of the 1973 Survey of Doctoral Scientists and Engineers." (1976)

"Employment Status of Ph.D. Scientists and Engineers: 1973 and 1975." (1976)

"Doctoral Scientists and Engineers in the United States: 1975 Profile." (1976)

"Field Mobility of Doctoral Scientists and Engineers." (1975)

"Doctoral Scientists and Engineers in the United States: 1973 Profile." (1974)

The following reports, published by the National Science Foundation, are also based on the 1979, 1977, 1975, and 1973 surveys:

*"Employment Opportunities for Ph.D. Scientists and Engineers: Shift from Academia to Industry," *Science Resource Studies Highlights* (1981) NSF 81-312.

*"Characteristics of Doctoral Scientists and Engineers in the United States: 1979." (1980) NSF 80-323.

*"Work Activities of Doctoral Scientists and Engineers Show Substantial Change Between 1973 and 1977," *Science Resources Studies Highlights* (1978) NSF 78-316.

*"Characteristics of Doctoral Scientists and Engineers in the United States: 1977." (1979) NSF 79-306.

**"Doctoral Scientists and Engineers in Private Industry, 1973," Reviews on Data on Science Resources. (1976)

**"Work activities of Employed Scientists and Engineers in the U.S. Labor Force, July 1973," Reviews of Data on Science Resources. (1975)

**"Characteristics of Doctoral Scientists and Engineers in the United States: 1975."

**"Characteristics of Doctoral Scientists and Engineers in the United States: 1973."

*Available from NSF.
**Available from the U.S. Government Printing Office.

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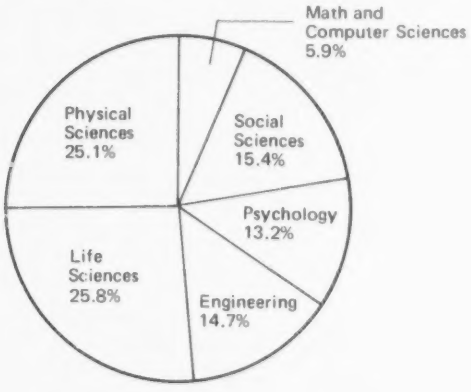
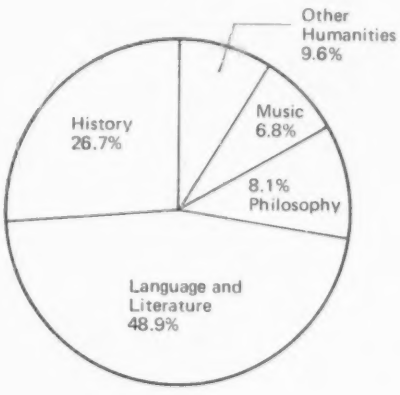
SUMMARY

The data in the 1981 Profile report are based on the Survey of Doctorate Recipients which is conducted bienially by the National Research Council. The analyses pertain to 434,600 scientists, engineers, and humanists who earned doctorates within the 42-year period 1938-1980 and were residing in the United States in February 1981.

Based on a survey sample of 63,022 Ph.D.s, the total population of Ph.D. scientists and engineers in the United States in 1981 who had received their degrees from January 1938 through June 1980 was estimated to be 358,600, of whom 340,900 were in the labor force. The equivalent figures for the humanities were 76,000 in the population and 69,700 in the labor force.



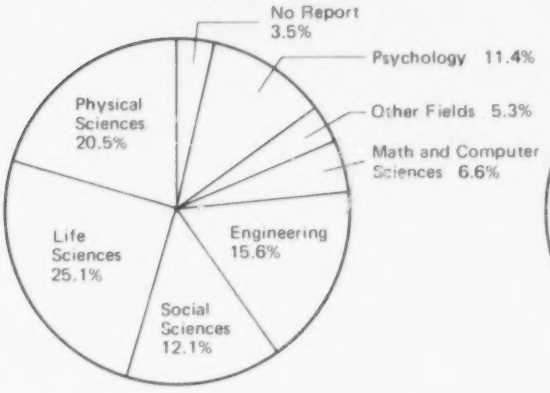
Science and Engineering Ph.D. Population, 1981
N = 358,600



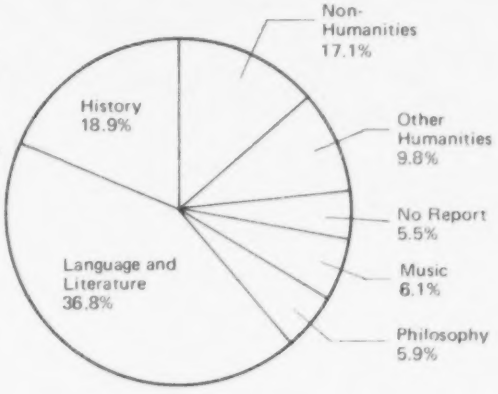
Humanities Ph.D. Population, 1981
N = 76,000

- Since 1979 there has been a 10 percent increase in both the total population of science/engineering Ph.D.s and the number of science/engineering Ph.D.s employed.
- Over 80 percent of the individuals who earned their Ph.D.s in earth/environmental sciences, medical sciences, psychology, computer sciences, and engineering were employed in their Ph.D. field in 1981. In contrast, only 61 percent of the Ph.D.s in physics/astronomy were employed in physics/astronomy.
- There has been a 7 percent increase in the population of humanities Ph.D.s since 1979 and an 8 percent increase in the number of humanities Ph.D.s who are employed.

- Approximately 87 percent each of the individuals who earned their Ph.D.s in music and art history were also employed in these same fields.



Employment Fields for Science and Engineering Ph.D.s, 1981
Total Employed = 338,300



Employment Fields for Humanities Ph.D.s, 1981
Total Employed = 68,600

- Approximately 88 percent of the science/engineering Ph.D. population were men and 12 percent were women, a 2 percent increase for women since 1977.

- Women comprised 27 percent of the Ph.D.s earned in the humanities, a 5 percent increase since 1977. Women were most highly represented within the fields of art history (46 percent) and modern languages (40 percent), and least represented in the field of philosophy (14 percent).

- An estimated 11 percent of the science/engineering doctoral population were members of racial/ethnic minority groups, with engineering having the largest percentage of minorities (20 percent) and psychology and earth/environmental sciences having the smallest percentages (6 percent each).

- The overall percentage of racial/ethnic minority members with Ph.D.s in the humanities was 6 percent in 1981, an increase of 3 percent since 1977.

- Approximately 338,300 Ph.D. scientists and engineers were employed in February 1981: 317,400 (93.8 percent) full-time; 10,400 (3.1 percent) part-time; and 10,500 (3.1 percent) on postdoctoral appointment.

- An estimated 2,600 Ph.D.s in science and engineering were unemployed and seeking employment in February 1981, yielding an unemployment rate of 0.8 percent of the labor force. The unemployment rate for female scientists and engineers was higher than the rate for male scientists and engineers for all fields combined (2.4 percent for women compared with 0.6 percent for men).

- For the science/engineering fields, Ph.D.s in computer sciences had the highest rate of full-time employment (97 percent of those in the population), and Ph.D.s in biological sciences reported the lowest rate (81 percent).

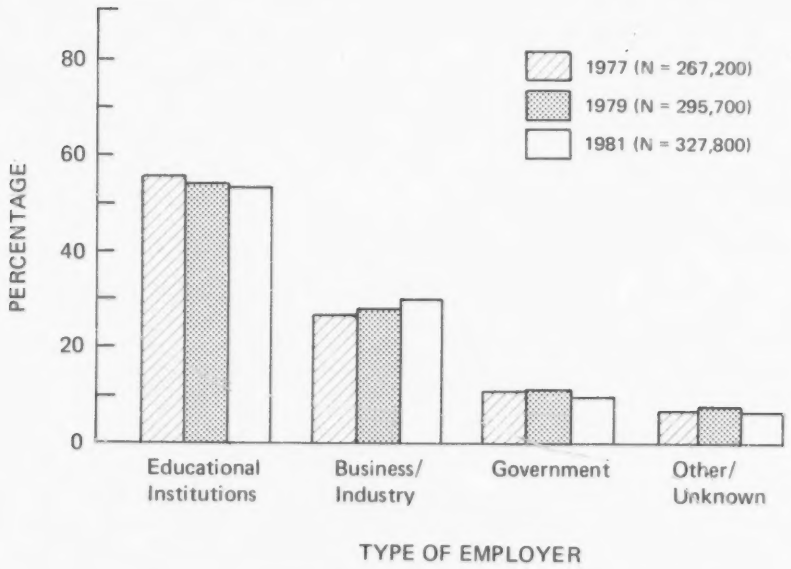
- Approximately 68,600 Ph.D.s in the humanities were employed in February 1981: 63,500 (92.6 percent) full-time; 4,600 (6.6 percent) part-time and 500 (0.8 percent) on postdoctoral appointments.

- An estimated 1,100 Ph.D.s in the humanities were unemployed and seeking employment in February 1981, yielding an unemployment rate of 1.5 percent of the labor force. The unemployment rate for female humanists was higher than the rate for male humanists for all fields combined (2.6 percent for women compared with 1.1 percent for men).

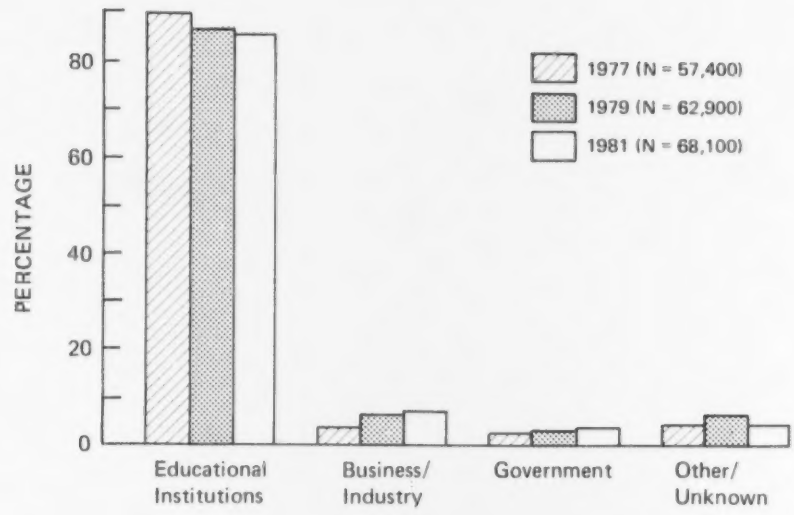
- With the exception of those in art history (77.9 percent), Ph.D.s in the various humanities subfields reported between 81 and 86 percent full-time employment.

- Over 50 percent of the Ph.D.s in science/engineering were employed by educational institutions, and approximately 30 percent were employed by business/industry.

- Over 85 percent of the humanities Ph.D.s were employed by educational institutions, including eight percent who were employed by two-year colleges or elementary/secondary schools.

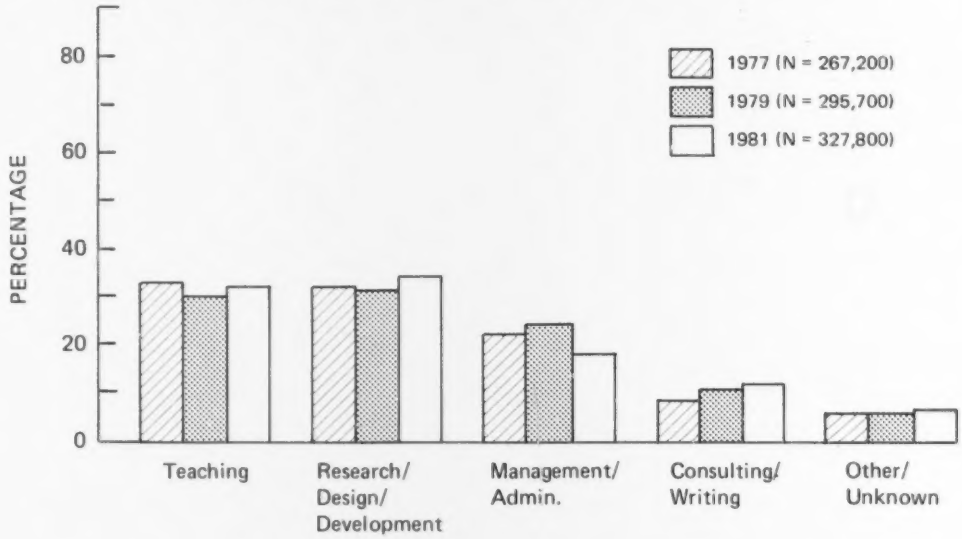


Distribution of Employed Doctoral Scientists and Engineers by Type of Employer (excluding postdoctoral appointees), 1977, 1979, and 1981

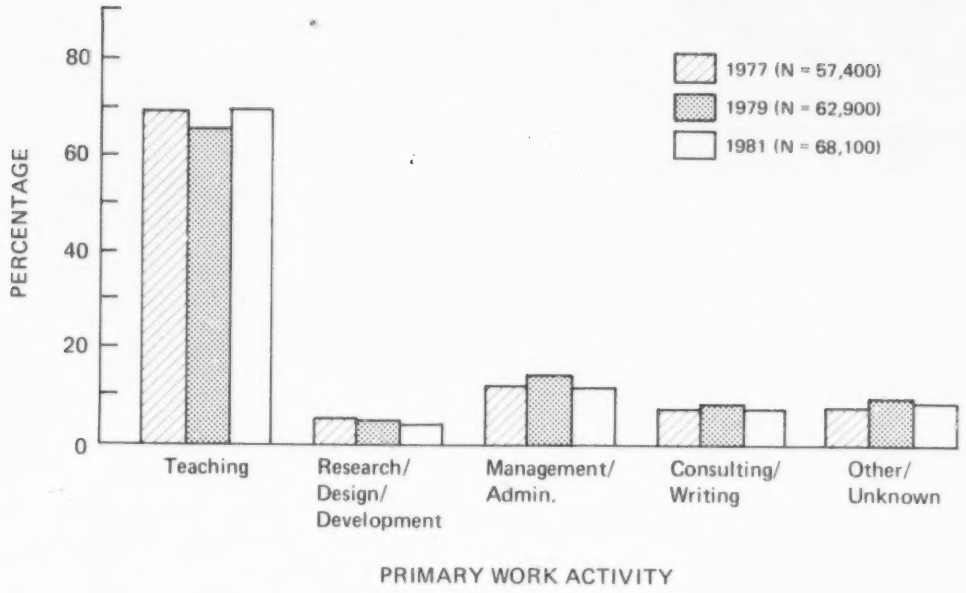


Distribution of Employed Humanists by Type of Employer (excluding postdoctoral appointees), 1977, 1979, and 1981

- Approximately 34 percent of the employed science/engineering Ph.D.s were engaged in research, development and design work, while 31 percent were primarily engaged in teaching.
- Almost 70 percent of the employed Ph.D.s in the humanities were engaged primarily in teaching.



Distribution of Employed Doctoral Scientists and Engineers by Primary Work Activity (excluding postdoctoral appointees), 1977, 1979, and 1981



Distribution of Employed Humanists by Primary Work Activity (excluding postdoctoral appointees), 1977, 1979, 1981

- The median annual salary in February 1981 for full-time employed Ph.D. scientists and engineers was $34,800, with engineering Ph.D.s reporting the highest median salary ($40,200), and psychology and social sciences Ph.D.s the lowest ($30,900 each).

- Women reported lower median salaries ($27,100) than men ($35,700) for all science and engineering fields.

- Ph.D. scientists and engineers employed by the federal government and business and industry had the highest median salaries (approximately $40,000) and those employed by state and local government and two-year colleges had the lowest salaries ($28,000).

- The median annual salary for full-time employed Ph.D.s in the humanities was $26,300, with speech/theater Ph.D.s reporting the highest salary ($28,300) and classical languages and literature the lowest ($24,900).

- Men in the humanities reported median salaries of $27,400, compared with $23,200 for women.

- Humanities Ph.D.s working in educational institutions reported the highest salary, $26,500, and those employed in business and industry the lowest, $21,800.

- Overall, the percentage of science/engineering Ph.D.s with academic rank of full-professor was greater for men than for women as of 1981, and only 38 percent of the women held tenured positions compared with 65 percent of the academically employed men.

- Nearly 70 percent of all academically employed humanists held tenured positions, and an additional 14 percent were in tenure track positions.

INTRODUCTION

The National Research Council (NRC) has long been concerned with the supply and utilization of scientists and engineers. The Survey of Doctorate Recipients (SDR), a biennial survey, was designed to answer questions related to supply, and to provide information on both the demographic characteristics and the current employment status of Ph.D.s[1] in the United States. The survey, maintenance of the file, and related research are conducted by the Office of Scientific and Engineering Personnel (formerly the Commission on Human Resources) with the support of the National Science Foundation (NSF), the National Endowment for the Humanities (NEH), the National Institutes of Health (NIH), and the Department of Energy (DOE).

The SDR is a longitudinal survey which includes Ph.D.s in the sciences,[2] engineering, and humanities who have earned their degrees between 1930 and the present. This 1981 report is based on the results of the fifth biennial survey (the third to include Ph.D.s in the humanities). The report focuses primarily on the demographic characteristics and employment status of recipients of Ph.D.s granted from January 1938 to June 1980 who were residing in the United States in February 1981.[3] Chapter I consists of analyses of doctorates in

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[1]Recipients of such doctorates as D.Sc., D.A., D.A.S., etc. are included in the survey sample as well as Ph.D.s.

[2]Throughout this report the population of doctorate-holding scientists is defined to include those with doctorates in the natural and social sciences, and mathematics. A detailed list of science fields appears as part of the survey questionnaire reproduced in Appendix A.

[3]To provide the reader with a more complete picture of the Ph.D. population as of February 1981, information on individuals who earned their Ph.D. degree between July 1980 and January 1981 is included in Appendix B.

the sciences and engineering, which includes the broad fields of mathematics, computer sciences, physics/astronomy, chemistry, earth/environmental sciences, engineering, life sciences (agricultural, medical, and biological), psychology, and social sciences. Chapter II includes analyses of Ph.D.s in the humanities fields of art history, classical languages, English/American literature, history, modern languages and literature, music, philosophy, speech, and "other humanities." The tabular data in the report is in the same format as the 1979 report so as to facilitate comparisons.

A report on the employment characteristics of recent doctorate recipients (i.e., 1973-1976 Ph.D.s in science, engineering, and the humanities) is planned for 1982. The report will focus on the changing situations for young Ph.D.s (e.g., changes in the role of postdoctoral appointments, increasing use of off-ladder appointments in academia, changes in tenure status, the move away from academic employment, and shifts in the primary work activity of recent Ph.D.s in government and business/industry).

The 1981 Sample

The 1981 roster of science, engineering, and humanities Ph.D.s contains data on 483,632 individuals. The roster consists of scientists, engineers, and humanists who earned doctorates within the period of January 1938 to January 1981. The population covers three groups of doctorate recipients:

Segment 1 includes those individuals recorded in the NRC's Doctorate Records File, who earned their doctoral degree in science, engineering or the humanities. Individuals who were foreign citizens and who, at the time they received the degree, indicated in the NRC's Survey of Earned Doctorates that they intended to leave the United States after receiving their degrees were excluded.

Segment 2 includes those few individuals who earned their doctorates in education or professional fields but were known to have been subsequently employed as scientists or engineers according to the NSF's Register of Scientific Personnel (1968-1970), Engineer Register (1967-1969), or Employment Survey (1971).

Segment 3 includes individuals who earned their doctorates at foreign institutions and were known to be working in the United States as scientists or engineers according to a number of sources such as American Men and Women of Science, the NSF's National Register of Scientific and Technical Personnel, employment records of federal laboratories and selected large industrial companies, and college and university catalogs of doctorate-granting institutions.

The sampling frame[4] was stratified to assure coverage of all significant subpopulations. The stratification variables were field of doctorate or field of science/engineering employment, the year in which the doctoral degree was awarded, degree category (that is, segments 1, 2, and 3), sex, racial/ethnic group, and citizenship. Each stratum had a sampling rate which varied from 2 to 100 percent, so as to provide sufficiently large samples for small subgroups of the population. Within each stratum, a simple random sample was selected. The sample sizes for the stratification categories are given in Table D.1 of Appendix D. The overall sampling rate, from the roster of 483,632 Ph.D.s, was 13.5 percent.[5]

Survey Methodology

The survey sample included 65,391 individuals, of whom 2,369 were

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[4]Further explanation of the sampling frame is provided in Appendix C.

[5]A discussion of sampling error is provided in Appendix E.

not surveyed because they were known to be deceased or out-of-scope[6] prior to the survey. Thus, the mailing sample consisted of 63,022 individuals.

Addresses were located for 90 percent of the survey sample. The sources for these addresses included the Doctorate Records File (NRC), American Men and Women of Science, the National Faculty Directory, college and university catalogs, and responses from previous surveys, as well as many alumni offices, departments of individuals' baccalaureate and doctoral institutions, and several professional societies.

The first mailing of the 1981 survey was conducted in March 1981. A follow-up mailing to those who had not yet responded took place in May 1981. Special follow-up mailings were conducted in August/September 1981 to individuals who were either new to the sample in 1981 or who had responded to a prior survey. The special follow-ups included the use of an abbreviated questionnaire which listed prior responses given by the individuals. The sample members were asked to update key questionnaire items.

Weighting of Responses

Responses are defined as the number of completed questionnaires that were returned by sample members plus the number of forms that were returned with an indication that the sample member was deceased.

Information was collected on 39,547 of the 63,022 individuals in the survey sample, yielding a response rate of 63 percent.[7] The response rate, when calculated on the basis of those in the sample who were actually contacted (56,511), was 70 percent.

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[6]Those individuals who were out-of-scope are described in Appendix F, Table F.1.

[7]See Appendix D for detailed response rates for the 1981, 1979, 1977, 1975 and 1973 surveys.

Population estimates were made by weighting the responses received. The individuals who were known to be deceased or out of scope prior to the survey were excluded from the survey and weighted by sample weights (i.e., the ratio of a stratum's population size to its sample size).

The responses received from the survey sample (63,022) were weighted by the product of the weight for nonresponse and the sample weight. The weight for nonresponse is the ratio of the number of survey sample cases in the stratum to the number of responses in the stratum.[8] The weighting procedure is illustrated by the following.[9]

Number of responses	X	Weights for nonresponse	=	Survey sample size (63,022)	X	Sample weights	=	Estimated Population size using all responses (465,981)[10]
				Those excluded from survey sample (2,369)	X	Sample weight	=	Estimated population size for excluded cases (17,651)
				Total sample size (65,391)				Estimated total population (483,632)

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[8]For a discussion of nonresponse bias see Appendix G.

[9]See Appendix F for a detailed explanation of the weighting procedure.

[10]This figure is higher than the population estimates in Chapters I and II since it includes responses received from individuals residing in foreign countries, those known to be deceased from the 1981 survey, those with doctorates in education or professional fields, and those who received their doctoral degree between July 1980 and January 1981--all of whom are out-of-scope for this report.

CHAPTER I

SCIENCE AND ENGINEERING

DOCTORAL POPULATION BY FIELD

Fields of doctorate analyzed in this science and engineering chapter are as follows: agricultural sciences, biological sciences, chemistry, computer sciences, earth/environmental sciences, engineering, mathematics, medical sciences, physics/astronomy, psychology, and the social sciences.

Included in the employment figures, unless otherwise stated, are those Ph.D.s who were on postdoctoral appointments as well as those who were employed part-time or full-time during February 1981. Ph.D.s who were retired or unemployed in February 1981 are not included in the employment estimates.

TABLE 1.1 Distribution of Doctoral Scientists and Engineers in the United States, 1938-1980 Graduates by Field of Doctorate and Field of Employment, 1981

	Field of Doctorate		Field of Employment		
	N	%	N	% of Total Employed	% of Science-Employed[+]
All Fields (N)	358,600	100.0	338,300*	100.0	100.0
Mathematics	19,000	5.3	13,900	4.1	4.5
Computer Sciences	2,200	0.6	8,300	2.5	2.7
Physics/Astronomy	29,200	8.2	19,000	5.6	6.1
Chemistry	48,000	13.4	35,300	10.4	11.4
Earth/Environ. Sciences	12,400	3.5	15,200	4.5	4.9
Engineering	52,900	14.7	52,900	15.6	17.1
Agricultural Sciences	16,500	4.6	14,700	4.4	4.8
Medical Sciences	11,100	3.1	20,400	6.0	6.6
Biological Sciences	64,800	18.1	49,600	14.7	16.1
Biochemistry[#]	**14,000**	**3.9**	**10,000**	**2.9**	**3.2**
Psychology	47,400	13.2	38,600	11.4	12.5
Clinical	**16,700**	**4.7**	**18,400**	**5.4**	**6.0**
Social Sciences	55,100	15.4	40,900	12.1	13.2
Nonscience/Nonengineering			17,800	5.3	
No Report			11,700	3.5	

[+]Percentages are based on the estimated number of individuals employed in science and engineering (N = 308,800).
*Includes postdoctoral appointees as well as full-time and part-time employed Ph.D.s.
[#]Code 280 (biochemistry) from the broad field of chemistry has been merged with Code 540 from the broad field of biological sciences. The estimated number of Ph.D.s involved in this transfer is 3,800 for field of doctorate and 2,800 for field of employment.

Table 1.1 gives the distribution of 1938-1980 doctoral scientists and engineers in the United States by field of doctorate and field of

employment as of February 1981.[11] Also shown in Table 1.1 are the percentages of these Ph.D.s who were employed only in science/engineering fields.

Since 1979 there has been a 10 percent increase both in the number of science and engineering Ph.D.s awarded and the number of Ph.D.s employed in science and engineering. In the total population of 1938-1980 graduates (Table 1.1), the fields with the largest percentage of doctorate recipients as of 1981 were the biological sciences (18.1 percent), the social sciences (15.4 percent), engineering (14.7 percent),chemistry (13.4 percent), and psychology (13.2 percent).[12] The fields in which the largest percentage of science/engineering Ph.D.s were employed in 1981 were essentially the same fields, i.e., engineering (15.6 percent), biological sciences (14.7 percent), social sciences (12.1 percent), psychology (11.4 percent), and chemistry (10.4 percent).

As Table 1.1 shows, the difference between the number of individuals in a doctoral field and in the corresponding employment field was large for some disciplines. Field definition may, in some cases, contribute to these differences. For example, the fields of mathematics and computer sciences have a great deal in common and the mobility between them may partially account for the net loss of

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[11] Individuals who earned Ph.D.s in science/engineering between January 1, 1938 and June 30, 1980 are included in Chapter I tables. For estimates of Ph.D.s who earned their degrees between July 1, 1980 and January 30, 1981, see Appendix B.

[12] When comparing this table with Table 1.1 in pre-1979 Profile reports, the reader should note that code 280 (biochemistry) from the broad field of chemistry has been merged with code 540 (biochemistry) from the broad field of biological science. The estimated number of Ph.D.s involved in this transfer is 3,800 for field of doctorate and 2,800 for field of employment. See Appendix A for the science/engineering specialties list which gives fine field codes. Also, pre-1979 Profile reports have used both field of employment and field of doctorate as independent variables in cross-tabulations. The 1979 and 1981 reports use only field of doctorate.

individuals from Ph.D. field to employment field for mathematics (19,000 to 13,900) and the net gain in the computer sciences (2,200 to 8,300).

Another factor that may account for the apparent transition of individuals from Ph.D. field to field of employment is the overlapping that occurs in the science fields.[13] For example, net gains in medical and environmental sciences may have occurred largely as a result of the transfer of individuals from biological and agricultural sciences. Other fields showing large net losses from field of doctorate to field of employment were the social sciences, chemistry, physics/astronomy, and psychology. Approximately 5 percent of the employed science/engineering Ph.D.s had moved into nonscience employment fields. The field mobility of employed science/engineering Ph.D.s is examined in more detail in the following section.

FIELD MOBILITY[14] OF EMPLOYED PH.D.S

For the estimated 338,300 employed doctoral scientists and engineers in the United States in February 1981, Table 1.2 shows the relationship between their field of employment and field of doctorate. The greatest field mobility usually occurs between those fields that are closely related. Of the Ph.D.s in mathematics, 9.6 percent were employed in computer sciences, and 5.3 percent in engineering. Also employed as engineers were 10 percent of the Ph.D.s in computer sciences. Mobility across fields was especially evident among the Ph.D.s in the life sciences (agricultural, biological, and

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[13]See Appendix H for clarification of the fine field composition of the eleven broad science fields, along with the estimated number of doctoral scientists and engineers employed in each fine field category.

[14]For purposes of this report, field mobility is defined as being employed in a field other than one's doctoral field.

TABLE 1.2 Field Mobility of Employed Doctoral Scientists and Engineers, 1981

1981 Field of Employment	Total Employed+	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
All Fields (N)	338,300	18,100	2,200	28,100	44,700	11,800	51,600	15,100	10,500	59,500	45,100	51,600
Mathematics	13,900	**70.8**	1.9	0.8	*	0.2	0.5	0.2	0.0	0.3	0.1	0.5
Computer Sciences	8,300	9.6	**83.9**	4.7	1.0	0.1	3.4	0.5	0.1	0.4	1.2	0.7
Physics/Astronomy	19,000	0.3	0.0	**61.3**	1.3	0.7	1.7	*	0.1	0.1	0.0	0.1
Chemistry	35,300	0.0	0.0	1.0	**73.8**	0.6	0.9	1.3	1.2	1.9	0.0	0.1
Earth/Envir. Sciences	15,200	0.7	0.0	4.1	2.2	**85.4**	1.9	1.7	0.3	2.0	0.1	0.6
Engineering	52,900	5.3	10.0	17.0	5.9	3.9	**82.4**	0.4	0.3	1.0	0.6	0.6
Agricultural Sciences	14,700	0.2	0.0	0.1	0.2	0.9	0.2	**77.5**	0.3	3.6	0.0	0.8
Medical Sciences	20,400	0.6	0.6	1.3	3.5	0.3	0.6	1.5	**84.3**	11.8	2.6	1.5
Biological Sciences	49,600	2.8	0.0	1.6	4.0	1.6	0.6	7.2	8.4	**73.4**	1.1	0.4
Psychology	38,600	0.2	0.0	*	*	*	0.0	0.2	0.2	0.1	**84.3**	0.8
Social Sciences	40,900	1.2	*	0.4	0.1	0.3	0.3	2.2	0.2	0.2	1.8	**75.6**
Nonscience/Nonengineering	17,800	4.5	2.2	4.2	3.7	2.5	3.9	3.9	2.2	2.2	5.0	14.4
No Report	11,700	3.7	1.2	3.6	4.3	3.4	3.5	3.5	2.4	3.1	3.1	3.8

+Includes postdoctoral appointees as well as full-time and part-time employed Ph.D.s.
*Less than 0.1 percent.

medical). Doctorate recipients in the biological sciences were frequently employed in the medical sciences (11.8 percent), and Ph.D.s in the medical and agricultural sciences often changed to the biological sciences for employment (8.4 and 7.2 percent, respectively).

The Ph.D. fields retaining the highest percentages of their Ph.D.s in the corresponding employment fields were earth/environmental sciences (85.4 percent), medical sciences (84.3 percent), psychology (84.3 percent), computer sciences (83.9 percent), and engineering (82.4 percent). Computer scientists who switched to a different employment field most often moved into engineering (10.0 percent), and those leaving the medical sciences moved most frequently into biological sciences (8.4 percent). The field of physics/astronomy retained the smallest percentage of its Ph.D.s (61.3 percent), with 17.0 percent moving into the engineering field for employment.

In summary, field mobility is in part due to similarities between fields, but it is also evident that individuals in fields reported to have a surplus of personnel (chemistry, physics/astronomy) are gaining employment in fields where there are personnel shortages (computer sciences, medical sciences, environmental sciences). Mobility in the relatively new Ph.D. field of computer sciences works both ways since computer scientists are utilized in a variety of employment fields, and individuals from other Ph.D. fields often have employment opportunities in the computer sciences field. This mobility trend is also recognizable in the 1979 Profile data.

DEMOGRAPHIC CHARACTERISTICS BY FIELD OF DOCTORATE

Men comprised approximately 88 percent of the 1938-1980 doctoral scientists and engineers in the United States during February 1981 (Table 1.3). The Ph.D. fields with the highest percentage of men were engineering (99.0 percent), physics/astronomy (96.9 percent), agricultural sciences (96.7 percent), and earth/environmental sciences (95.0 percent). The number of women Ph.D.s in the science and

TABLE 1.3 Demographic Characteristics of Doctoral Scientists and Engineers by Field of Doctorate, 1981

Demographic Characteristics	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Total Population (N)	358,600	19,000	2,200	29,200	48,000	12,400	52,900	16,500	11,100	64,800	47,400	55,100
Sex												
Male	87.6	91.5	91.8	96.9	92.7	95.0	99.0	96.7	82.7	81.0	72.4	82.9
Female	12.4	8.5	8.2	3.1	7.3	5.0	1.0	3.3	17.3	19.0	27.6	17.1
Racial/Ethnic Group												
White/Caucasian	87.5	85.9	89.3	88.2	87.7	92.9	78.6	89.5	85.4	89.1	92.7	88.2
Minority Group	10.9	11.0	8.7	9.7	10.8	6.1	20.0	9.7	13.5	9.6	5.6	10.1
Hispanic	1.4	1.6	1.0	1.2	1.3	0.8	1.3	1.6	2.3	1.1	1.6	1.6
Black	1.2	1.1	0.1	0.8	0.9	0.2	0.5	1.3	1.4	1.2	1.8	2.5
Asian	7.7	8.0	6.7	7.2	8.2	4.8	17.6	6.0	8.8	6.8	1.4	5.5
American Indian	0.6	0.4	0.9	0.6	0.4	0.2	0.6	0.9	0.9	0.5	1.0	0.6
No Report	1.6	3.1	2.1	2.0	1.5	1.0	1.4	0.8	1.2	1.2	1.6	1.6
Age in 1981												
Under 30	2.4	3.0	4.5	1.8	3.6	2.2	1.6	1.3	2.6	2.7	3.3	1.5
30-34	14.6	14.2	32.1	13.0	12.4	16.3	13.4	10.7	15.6	16.3	19.0	12.9
35-39	21.5	24.5	36.6	21.2	18.5	20.8	21.1	18.3	22.2	22.6	22.8	22.0
40-44	18.9	21.5	20.9	22.7	18.4	18.0	22.6	17.4	16.8	16.7	14.9	19.5
45-49	12.3	12.1	3.7	12.3	12.5	14.1	16.1	13.1	14.7	10.9	11.2	10.6
50-54	10.3	9.1	0.7	10.6	11.6	10.2	9.8	12.8	10.2	10.0	9.9	10.0
55-59	8.6	6.1	1.2	9.5	8.6	7.7	7.9	9.6	7.9	9.0	8.7	9.3
60-64	5.8	4.0	0.2	5.2	7.8	4.6	4.4	9.5	4.2	5.4	5.4	6.9
Over 64	5.6	5.5	*	3.8	6.7	6.0	3.0	7.3	5.8	6.4	4.7	7.5
Median Age (Years)	43	41	36	43	44	42	43	45	42	42	41	43
Calendar Year of Ph.D.												
1938-1949	5.9	6.4	0.0	5.7	12.0	6.1	3.5	6.4	4.7	6.9	2.9	4.7
1950-1959	14.6	10.8	0.6	17.1	19.8	11.0	11.9	20.1	11.3	15.7	13.7	12.3
1960-1969	29.7	34.7	6.9	34.5	32.0	29.5	35.2	29.4	27.0	28.2	25.5	25.3
1970-1973	19.7	22.3	29.4	19.6	15.7	19.4	22.8	18.7	19.6	18.6	18.8	21.5
1974-1977	18.5	16.6	34.0	15.2	12.4	19.7	17.1	15.4	21.5	18.5	23.0	22.9
1978-1980[+]	11.6	9.2	29.2	8.0	8.0	14.4	9.7	10.0	16.0	12.1	16.0	13.4
Citizenship												
U.S.	93.9	94.2	90.1	91.4	94.1	93.2	89.5	95.4	93.5	95.1	98.4	94.1
Foreign[#]	6.0	5.7	9.9	8.6	5.9	6.8	10.4	4.6	6.4	4.9	1.6	5.8
No Report	*	*	0.0	0.0	0.0	0.0	0.1	0.0	0.1	*	0.1	0.1

[+]Excludes Ph.D.s awarded in July-December, 1980. See Appendix B for the demographic characteristics of Ph.D. scientists and engineers who received their degrees between July 1, 1980 and January 31, 1981.

[#]In view of the lack of a comprehensive sampling frame for foreign-earned Ph.D.s in the United States, few additions have been made to Ph.D.s in the foreign citizenship status since the 1973 survey. Therefore, the number of S/E Ph.D.s who are foreign citizens may be underestimated.

*Less than 0.1 percent.

engineering fields continues to be small (12.4 percent), with a slight increase (1.2 percent) since 1979. Women were more highly represented in the fields of psychology (27.6 percent), biological sciences (19.0 percent), medical sciences (17.3 percent), and the social sciences (17.1 percent). Women were less likely to hold a doctorate in fields such as physics/astronomy (3.1 percent) and agricultural sciences (3.3 percent). As in previous years, engineering produced the smallest number of female doctorate recipients; only 1 percent of the Ph.D.s in engineering were women.[15]

Approximately 11 percent of the science/engineering doctoral population was made up of individuals who classified themselves as members of racial/ethnic minority groups (Black, American Indian, Hispanic, and Asian). The largest minority group was Asian (7.7 percent). The field of engineering had the highest percentage of minority group members (20.0 percent), while the smallest proportions of racial/ethnic minority members were found in psychology (5.6 percent) and earth/environmental sciences (6.1 percent). This continues a pattern which has been observed in the data from previous surveys.

Computer sciences continued to be the field with the highest percentage of Ph.D.s under 35 years of age (36.6 percent), although the fields of psychology and the biological sciences had the largest numbers of doctorate recipients under 35 years of age (10,600 and 12,300, respectively). The field with the highest percentage of Ph.D.s under 40 years of age was again computer sciences (73.2 percent), while agricultural science had the highest percentage of doctoral recipients over 40 years of age (69.7 percent).

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[15] In 1975, 1977, and 1979 it was estimated that 0.5, 0.6, and 0.8 percent respectively of the Ph.D.s in engineering were women (National Research Council, Commission on Human Resources, Science, Engineering, and Humanities Doctorates in the United States, 1975, 1977, 1979 Profiles. Washington D.C.: National Academy of Sciences).

The relative growth of the science and engineering fields can be seen through an examination of the data on the year the doctorate was awarded. The field of computer sciences has shown the most rapid growth over the past decade; 92.6 percent of the computer science Ph.D.s graduated during the 1970-1980 period. Aside from this relatively young field of computer sciences, the fields of psychology and medical sciences have proportionately high percentages of recent Ph.D. graduates, with 16 percent in each field having earned their Ph.D.s during 1978-1980. Chemistry and physics/astronomy had the smallest percentages of new Ph.D. graduates, each with only 8.0 percent of their graduates having earned their degrees during 1978-1980.

Engineering, computer sciences, and physics/astronomy continued to have the highest percentages of foreign citizens (10.4, 9.9, and 8.6 percent, respectively), whereas in the field of psychology as few as 1.6 percent of the Ph.D.s were foreign citizens.[16]

EMPLOYMENT STATUS BY FIELD OF DOCTORATE

Of the 358,600 doctoral scientists and engineers in the United States in February 1981, approximately 317,400 (88.5 percent) were employed full-time, 10,400 (2.9 percent) were employed part-time, and 10,500 (2.9 percent) held postdoctoral appointments (Table 1.4A).[17] An estimated 2,600 Ph.D.s (0.7 percent of the total population of science/engineering Ph.D.s) were unemployed and seeking employment.[18]

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[16]Because of the absence of a comprehensive sampling frame for foreign-earned Ph.D.s working in the United States, the percentages of science/engineering Ph.D.s who are foreign citizens may be somewhat low.

[17]Postdoctoral appointments include fellowships, traineeships, research associateships, and internships.

[18]The unemployment rate is the percentage of Ph.D.s in the science/engineering labor force who were unemployed and seeking employment, 2,600/340,900, or 0.8 percent. Unemployment rates are shown in Table 1.10.

TABLE 1.4A Employment Status of Doctoral Scientists and Engineers by Field of Ph.D., 1981 (1938-1980 Graduates)

1981 Employment Status	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Total Population (N)	358,600	19,000	2,200	29,200	48,000	12,400	52,900	16,500	11,100	64,800	47,400	55,100
Employed Full-Time	88.5	92.5	97.1	91.8	87.9	90.3	95.4	89.4	85.3	80.5	86.6	90.0
Employed Part-Time	2.9	1.7	1.4	1.3	2.2	4.0	1.7	1.1	2.8	2.9	6.7	2.9
Postdoctoral Appointment+	2.9	1.0	1.2	3.1	3.0	1.5	0.4	0.9	6.4	8.5	1.7	0.7
Not Employed	5.3	4.6	0.2	3.6	6.5	3.8	2.2	7.9	5.1	7.6	4.6	5.9
Seeking Employment#	**0.7**	**0.5**	**0.2**	**0.6**	**0.7**	**0.7**	**0.1**	**0.4**	**0.7**	**1.4**	**1.0**	**0.7**
Not Seeking Employment	**0.9**	**0.9**	**0.0**	**0.8**	**0.7**	**0.3**	**0.3**	**0.7**	**1.4**	**1.7**	**1.0**	**1.0**
Retired	**3.5**	**3.1**	**0.0**	**2.1**	**5.0**	**2.7**	**1.9**	**6.8**	**2.9**	**4.4**	**2.5**	**3.9**
Other	**0.1**	*	**0.0**	**0.1**	**0.1**	**0.1**	*	**0.1**	**0.1**	**0.1**	**0.1**	**0.2**
No Report	0.4	0.2	0.1	0.2	0.4	0.4	0.2	0.6	0.4	0.5	0.4	0.5

+The percentage of postdoctoral appointees may be underestimated because information about foreign Ph.D.s who came to the U.S. for postdoctoral research or study is incomplete.

#Percentages are not unemployment rates because they are calculated on the total population, which includes those retired, those not seeking employment, and those not reporting status, none of whom are part of the labor force. For unemployment rates, see Tables 1.9 and 1.10.

*Less than 0.1 percent.

TABLE 1.4B Employment Status of Doctoral Scientists and Engineers by Field of Ph.D., 1981 (1975-1980 Graduates)

1981 Employment Status	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Total Population (N)	97,800	4,500	1,300	6,000	8,900	3,900	12,300	3,800	3,800	18,200	17,100	18,000
Employed Full-Time	84.5	93.6	95.8	83.0	83.0	90.0	97.4	94.3	76.8	63.6	85.4	92.5
Employed Part-Time	2.7	1.3	2.0	1.0	0.8	3.9	0.1	0.6	2.0	2.4	7.1	3.1
Postdoctoral Appointment+	9.7	2.6	1.9	13.3	13.8	4.3	1.4	3.2	17.5	28.5	4.6	1.2
Not Employed	2.8	2.4	0.2	2.3	2.4	1.7	0.5	1.2	3.6	5.3	2.5	3.1
Seeking Employment#	**1.2**	**1.0**	**0.2**	**0.6**	**0.5**	**1.1**	**0.2**	**0.2**	**0.7**	**2.3**	**1.4**	**1.4**
Not Seeking Employment	**1.5**	**1.4**	**0.0**	**1.6**	**1.8**	**0.4**	*	**0.9**	**2.9**	**3.0**	**0.9**	**1.7**
Retired	*	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.3**	**0.1**	**0.1**	*	**0.0**	*
Other	*	**0.1**	**0.0**	**0.0**	**0.1**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**	**0.0**
No Report	0.3	0.1	0.0	0.4	*	0.2	0.6	0.8	0.0	0.2	0.5	0.1

+The percentage of postdoctoral appointees may be underestimated because information about foreign Ph.D.s who came to the U.S. for postdoctoral research or study is incomplete.

#Percentages are not unemployment rates because they are calculated on the total population, which includes those retired, those not seeking employment, and those not reporting status, none of whom are part of the labor force. For unemployment rates, see Tables 1.9 and 1.10.

*Less than 0.1 percent.

The labor force of scientists and engineers consists of those Ph.D.s who were unemployed and seeking employment, together with those who were employed full-time and part-time and those on postdoctoral appointments. Those Ph.D.s who indicated they were not employed and not seeking employment, retired, or who specified "other" or gave no report (a total of 17,700), were considered to be outside the labor force. Therefore, the estimated number in the U.S. labor force in February 1981 was 340,900 or 95.1 percent of the total population of 1938-1980 Ph.D. scientists and engineers. The corresponding percentages in the labor force for 1979 and 1977 were 95.2 and 94.7 percent, respectively.

The field with the highest percentage of full-time employment was computer sciences. Of the 2,200 Ph.D.s in computer sciences, 97.1 percent were employed in full-time jobs. Other fields with high percentages of full-time employment were engineering (95.4 percent), mathematics (92.5 percent), and physics/astronomy (91.8 percent). Biological scientists reported the lowest percentage of full-time employment (80.5 percent).

Part-time employment was highest for Ph.D.s in psychology (6.7 percent) and lowest for those with doctorates in agricultural sciences (1.1 percent), physics/astronomy (1.3 percent), computer sciences (1.4 percent), and mathematics (1.7 percent).

Although the percentage of postdoctoral appointees may be underestimated due to incomplete data on foreign-earned Ph.D.s., doctorate recipients in biological and medical sciences reported the highest percentage of postdoctoral appointments (8.5 and 6.4 percent, respectively), while the lowest percentages of postdoctoral appointments were reported by Ph.D.s in engineering (0.4 percent) and the social sciences (0.7 percent).

The agricultural sciences and chemistry had the highest percentages of retired science and engineering Ph.D.s (6.8 and 5.0 percent, respectively). These fields also had relatively high percentages of Ph.D.s in upper age groups (see Table 1.3). The relatively new field of computer sciences had no retired Ph.D.s.

The 97,800 Ph.D.s who graduated during the years 1975-1980 (Table 1.4B) reflect similar high and low percentages of full-time and part-time employment. The highest percentages of full-time employment were reported by engineers (97.4 percent) and computer scientists (95.8 percent). Like those in the total population of Ph.D.s, recent psychology doctorate recipients reported the highest percentage of part-time employment (7.1 percent).

As in the total population, the percentage of postdoctoral appointments among the more recent graduates ran highest for Ph.D.s in the biological sciences (28.5 percent) and the medical sciences (17.5 percent), and lowest for social sciences (1.2 percent) and engineering (1.4 percent). As might be expected, the most apparent difference between the employment status of recent (1975-1980) doctorate recipients and the total doctoral population occurred in the area of postdoctoral appointments (9.7 and 2.9 percent, respectively). This is attributable to the tradition of taking postdoctoral appointments shortly after graduation.

There was a slightly smaller percentage of recent Ph.D.s employed full-time (84.5 percent) than was true for the 1938-1980 Ph.D.s (88.5 percent). These percentages nearly replicate the 1979 figures. The difference here is evidently due to the availability of early employment opportunities for young, unestablished Ph.D.s, rather than to an employment trend.

The percentage of those Ph.D.s who were not employed but seeking employment was highest for Ph.D.s in the biological sciences, both in the total population (1.4 percent) and among recent graduates (2.3 percent). This employment status was found least frequently among engineers, computer scientists, and agricultural scientists in both the overall population and in the recent Ph.D. cohort.

It should also be noted that the percentage of Ph.D.s who were not employed and not seeking employment was greater for the 1975-1980 Ph.D.s (1.5 percent) than for the 1938-1980 science/engineering Ph.D.

population (0.9 percent).[19] The highest percentage of Ph.D.s in this employment category occurred in the fields of medical and biological sciences. This held true for both recent Ph.D.s and for the total population of Ph.D.s.

TYPE OF EMPLOYER BY FIELD OF DOCTORATE

An estimated 327,800 Ph.D.s in science and engineering were employed in the United States in 1981 (full-time and part-time, excluding postdoctoral appointments). Table 1.5A shows the types of principal employers reported by the 1938-1980 Ph.D.s in February 1981.

Over half (51.2 percent) of the doctoral scientists and engineers were employed by four-year colleges and universities, and more than one-quarter (29.8 percent) were working in business or industry. The federal government was the third largest employer of science and engineering Ph.D.s (8.0 percent of the employed science/engineering Ph.D. population). In 1979, 52.2 percent of the science and engineering Ph.D.s reported that they were employed by four-year colleges and universities, 27.6 percent by business and industry, and 8.6 percent by the federal government.

The majority of Ph.D.s in the fields of social sciences and mathematics were employed by educational institutions (74.0 and 73.7 percent, respectively). For Ph.D.s in chemistry, engineering, and computer sciences, 50 percent or more reported working in business and industry. Earth/environmental scientists (17.9 percent) and agricultural scientists (15.3 percent) had the highest percentage of employment in the federal government.

The percentage of recent Ph.D.s (1975-1980) holding positions at four-year colleges and universities was lower than the percentage of

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[19] These percentages are not unemployment rates since they refer to individuals who are not employed and not seeking employment. This group is outside the labor force.

TABLE 1.5A Type of Employer of Full-Time and Part-Time Employed Doctoral Scientists and Engineers by Field of Ph.D., 1981 (1938-1980 Graduates)

		Field of Doctorate										
1981 Type of Employer	All Fields	Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population[+] (N)	327,800	17,900	2,100	27,200	43,200	11,700	51,400	15,000	9,800	54,000	44,300	51,200
Educational Institution	53.4	73.7	40.9	49.1	34.2	46.7	33.9	58.6	58.0	65.3	50.2	74.0
4-Year Coll/Univ/Med Sch.	**51.2**	**71.5**	**40.7**	**47.9**	**31.8**	**45.2**	**33.8**	**57.5**	**57.4**	**63.1**	**44.4**	**71.4**
2-Year College	**1.4**	**1.6**	**0.2**	**0.9**	**1.9**	**1.2**	*	**0.9**	**0.5**	**1.9**	**2.2**	**1.9**
Elem/Secondary School	**0.8**	**0.6**	**0.0**	**0.2**	**0.4**	**0.3**	*	**0.1**	**0.1**	**0.3**	**3.6**	**0.8**
Business/Industry[#]	29.8	17.8	49.7	33.9	56.3	28.1	53.7	20.6	22.0	15.7	23.6	9.7
U.S. Government	8.0	5.8	7.2	11.0	5.6	17.9	7.4	15.3	8.0	9.6	3.7	7.3
State/Local Government	1.9	0.2	0.0	0.3	0.7	3.5	0.7	2.4	2.7	1.8	4.5	2.6
Hospital/Clinic	2.9	0.2	0.0	1.1	0.8	0.1	0.1	0.2	5.9	3.3	13.9	0.3
Other Non-Profit Organization	3.2	1.8	2.2	4.6	2.3	3.0	3.8	1.9	2.3	2.8	3.5	3.7
Other	0.7	0.2	0.0	*	0.1	0.4	0.4	0.8	0.8	1.2	0.5	1.8
No Report	0.2	0.3	0.0	0.1	*	0.3	0.1	0.2	0.3	0.2	0.1	0.5

[+]Excluded from this table are 30,800 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.
[#]Includes self-employed.
*Less than 0.1 percent.

TABLE 1.5B Type of Employer of Full-Time and Part-Time Employed Doctoral Scientists and Engineers by Field of Ph.D., 1981 (1975-1980 Graduates)

		Field of Doctorate										
1981 Type of Employer	All Fields	Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population[+] (N)	85,300	4,300	1,300	5,000	7,400	3,700	12,000	3,600	3,000	12,000	15,800	17,200
Educational Institution	49.6	69.2	41.8	38.6	22.2	41.2	28.6	55.7	59.5	62.3	46.2	68.0
4-Year Coll/Univ/Med Sch.	**46.7**	**65.2**	**41.7**	**37.3**	**20.6**	**40.3**	**28.6**	**54.6**	**58.5**	**59.5**	**38.8**	**65.0**
2-Year College	**1.7**	**2.5**	**0.1**	**1.3**	**1.2**	**0.9**	**0.0**	**1.1**	**1.0**	**2.5**	**2.6**	**2.2**
Elem/Secondary School	**1.2**	**1.5**	**0.0**	**0.0**	**0.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.3**	**4.8**	**0.8**
Business/Industry[#]	30.7	21.5	51.1	42.8	68.1	34.0	60.5	26.0	17.5	18.1	20.9	11.2
U.S. Government	7.6	6.2	5.9	10.4	4.2	16.9	4.8	11.4	9.5	10.2	3.8	9.1
State/Local Government	2.6	0.2	0.0	0.1	1.4	3.5	1.0	2.6	2.8	2.0	5.2	3.9
Hospital/Clinic	4.6	0.7	0.0	1.5	1.0	0.0	*	0.2	5.9	3.2	19.6	0.6
Other Non-Profit Organization	4.0	2.2	1.2	6.2	3.1	4.2	5.0	3.6	3.1	2.4	3.7	5.1
Other	0.8	0.0	0.0	0.0	*	0.2	0.1	0.0	1.6	1.7	0.5	2.0
No Report	0.1	*	0.0	0.3	0.1	0.0	*	0.5	0.1	0.1	0.2	0.2

[+]Excluded from this table are 12,500 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.
[#]Includes self-employed.
*Less than 0.1 percent.

the 1938-1980 population (Table 1.5B). This pattern of decreasing employment at four-year colleges and universities and increasing employment in business and industry continues the employment trend observed in past Profile reports. The percentage of recent graduates employed at four-year colleges and universities changed from 50.6 percent in 1977 to 48.2 percent in 1979 to 46.7 percent in 1981. The percentage of recent Ph.D. graduates employed by business/industry increased from 25.6 percent in 1977 to 28.0 percent in 1979 to 30.7 percent in 1981.[20]

Recent Ph.D.s in mathematics and the social sciences continue to report educational institutions as their most frequent employers (approximately 70 percent for each field). In chemistry and physics/astronomy, however, the percentage of Ph.D.s employed by four-year colleges and universities was considerably lower for recent graduates than for the total group (approximately 10 percentage points lower). For computer and medical scientists, employment at a four-year college or university was nearly equal for both cohort groups.

Business and industry was the principal employer for large percentages of recent Ph.D.s in chemistry (68.1 percent) and engineering (60.5 percent). Compared with the total population, employment in business and industry has increased for recent Ph.D.s in most fields. However, employment in business and industry was lower for 1975-1980 Ph.D.s in medical sciences (4.5 percentage points less) and psychology (2.7 percentage points less) than for the 1938-1980 Ph.D.s in these fields. The federal government employed the largest percentage of Ph.D.s in earth/environmental sciences (16.9 percent), whereas state and local governments employed a large percentage of

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[20]These comparative figures come from previous Profile reports. National Research Council, Commission on Human Resources, Science, Engineering and Humanities Doctorates in the United States, 1977 ,1979 Profiles. Washington, D.C.: National Academy of Sciences, 1978, 1980.

recent psychology doctorate recipients (5.2 percent). This held true for the total Ph.D. population cohort as well.

PRIMARY WORK ACTIVITY BY FIELD OF DOCTORATE

Approximately 34 percent of the employed science and engineering Ph.D.s were engaged primarily in research/development/design during February 1981 (Table 1.6A), while 31 percent reported teaching as their primary work activity. Almost one-fifth (18.1 percent) of the employed Ph.D.s held managerial or administrative jobs, with 9.9 percent involved in research and development.

Research and development was the most frequently reported primary work activity of science and engineering Ph.D.s, except for those in mathematics, the social sciences, and psychology. Teaching was the primary work activity of approximately 55 percent of the Ph.D.s in mathematics and the social sciences. For all other fields, the percentage of Ph.D.s engaged in teaching ranged from approximately 20 to 30 percent. As would be expected, the highest percentage of psychology Ph.D.s (38 percent) were primarily engaged in consulting or providing professional services to individuals.

For the recent science and engineering Ph.D.s, the percentages who were primarily engaged in teaching were less in all fields than they were in the corresponding fields for the total 1938-1980 employed group. The largest differences were in the fields of physics/astronomy, chemistry, and earth/environmental sciences, where the percentage of recent Ph.D.s who indicated that teaching was their primary work activity was 8 to 10 percentage points less than they were in the corresponding fields for the total employed Ph.D. group (Table 1.6). As expected, recent Ph.D.s were more frequently involved in research and development and less frequently in management/administration. Of the total employed scientists and engineers, 18.1 percent were administrators (Table 1.6A), compared with only 10.4 percent of the 1975-1980 graduates (Table 1.6B).

TABLE 1.6A Primary Work Activity of Full-Time and Part-Time Employed Doctoral Scientists and Engineers by Field of Ph.D., 1981 (1938-1980 Graduates)

		Field of Doctorate										
	All Fields	Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population[+] (N)	327,800	17,900	2,100	27,200	43,200	11,700	51,400	15,000	9,800	54,000	44,300	51,200
Teaching	31.4	54.8	22.4	23.8	21.6	28.0	20.3	20.3	25.6	30.6	28.3	55.5
Research/Dvlp/Design	33.6	24.9	51.4	49.4	41.7	40.0	41.5	42.0	35.0	43.8	14.0	14.5
Management/Admin	18.1	10.6	16.7	18.9	24.1	17.3	24.9	20.1	20.2	13.4	14.9	15.4
of R&D	9.9	3.6	9.8	13.4	18.1	11.1	16.3	10.6	10.8	7.5	3.6	4.3
of Educ. Programs	4.1	5.1	4.7	2.5	1.9	1.6	3.4	5.3	5.5	3.4	5.4	6.8
of Other Activities	4.1	1.8	2.2	3.0	4.1	4.6	5.2	4.2	4.0	2.5	5.9	4.3
Consulting/Prof. Svcs	10.4	5.2	8.6	3.6	4.6	8.2	8.2	5.7	13.0	6.0	38.0	5.0
Writing/Editing	1.0	0.5	0.1	0.7	0.7	1.4	0.6	0.9	0.7	0.8	0.8	2.2
Mktg/Prod/Insp	1.9	1.0	0.6	1.1	4.0	1.2	2.5	4.2	1.1	1.8	0.4	1.3
Other	2.6	2.1	0.1	1.5	2.3	2.8	1.7	4.7	3.2	2.3	2.5	4.0
No Report	1.2	0.8	0.0	1.0	0.9	1.0	0.4	2.2	1.1	1.4	1.2	2.0

[+]Excluded from this table are 30,800 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.

TABLE 1.6B Primary Work Activity of Full-Time and Part-Time Employed Doctoral Scientists and Engineers by Field of Ph.D., 1981 (1975-1980 Graduates)

		Field of Doctorate										
	All Fields	Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population[+] (N)	85,300	4,300	1,300	5,000	7,400	3,700	12,000	3,600	3,000	12,000	15,800	17,200
Teaching	28.7	52.1	23.8	13.4	12.8	20.4	18.6	20.8	25.6	27.1	22.1	53.1
Research/Dvlp/Design	41.2	31.4	56.5	68.9	69.6	53.1	58.1	49.4	43.8	55.6	15.9	19.0
Management/Admin	10.4	5.1	11.3	8.2	8.5	12.7	12.8	10.9	14.8	6.6	11.2	11.8
of R&D	5.7	3.3	5.2	7.1	7.1	9.2	10.6	6.5	7.5	4.3	2.9	4.0
of Educ. Programs	1.9	1.2	4.3	0.1	0.1	0.1	0.4	1.5	4.2	0.9	3.5	3.7
of Other Activities	2.8	0.7	1.8	1.0	1.2	3.3	1.8	2.9	3.1	1.4	4.7	4.1
Consulting/Prof. Svcs	12.8	6.3	8.2	2.8	1.7	6.5	7.3	5.0	9.8	4.5	45.3	6.0
Writing/Editing	1.0	0.8	0.0	1.9	1.0	1.6	0.8	0.6	0.5	1.1	0.5	1.5
Mktg/Prod/Insp	2.0	*	0.2	2.2	4.5	0.7	1.6	4.6	1.1	2.8	0.5	2.5
Other	2.9	3.5	0.0	1.5	1.4	4.8	0.8	6.0	4.0	1.5	3.3	5.0
No Report	0.9	0.7	0.0	1.1	0.6	0.2	*	2.6	0.5	0.8	1.3	1.1

[+]Excluded from the table are 12,500 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.
*Less than 0.1 percent.

The percentage of chemistry and physics/astronomy Ph.D.s who were working primarily in research and development was considerably higher for the recent graduates than for all chemists and physicists/astronomers (aproximately 20 and 30 percentage points higher, respectively). As in the total population, a high percentage of recent psychology doctorate recipients reported their primary work activity was consulting or providing professional services to individuals (45.3 percent).

MEDIAN ANNUAL SALARY BY SEX, YEARS SINCE DOCTORATE, AND FIELD OF DOCTORATE

The median annual salary in February 1981 for full-time employed doctoral scientists and engineers, excluding those in the U.S. military, was $34,800 (Table 1.7).[21] Engineering Ph.D.s reported the highest median salary ($40,200), while Ph.D.s in psychology and social sciences had the lowest median salaries ($30,900 each).

Men had a median annual salary of $35,700, while the median annual salary for women was $27,100. Figure 1.1 shows, as did the 1977 and 1979 data, that women had lower median salaries than men in all fields. Among male science/engineering Ph.D.s, those in engineering and medical sciences had the highest salaries ($40,200 and $38,200, respectively). For women, engineering Ph.D.s received the highest median salary ($32,800). Large salary differences between men and women occurred in the field of agricultural science, where men earned $33,300 compared with $24,900 for women; medical science, where men earned $38,200 and women earned $30,100; and chemistry, where men earned $37,400 compared with $29,500 for women.

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[21] Comparable salary figures for 1979 and 1977 were $29,200 and $25,600, respectively.

TABLE 1.7 Median Annual Salaries* of Full-Time Employed Doctoral Scientists and Engineers by Sex, Years Since Ph.D., and Field of Ph.D., 1981 (in thousands of dollars)

Sex and Years Since Ph.D.	All Fields	Field of Doctorate										
		Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
TOTAL	$34.8	$31.8	$34.8	$36.9	$36.9	$34.9	$40.2	$33.1	$36.5	$32.5	$30.9	$30.9
5 or less	26.6	23.9	32.3	29.6	29.6	28.0	33.0	25.4	28.4	23.9	24.0	24.3
6-10	31.3	29.1	36.8	34.6	33.5	32.6	37.9	30.4	35.1	28.1	28.4	29.2
11-15	36.5	32.9		37.1	37.0	38.6	42.5	35.1	38.8	33.8	33.9	35.0
16-20	39.6	37.2			40.7	39.7	45.3	37.3	47.9	37.3	36.6	37.1
21-25	41.9	41.9		43.7	40.9		48.4	38.2	46.0	39.8	40.7	39.5
26-30	45.5			48.4	45.9		50.2	40.9		44.0	42.9	44.0
Over 30	46.6	47.2			47.5	50.3	50.3	42.0	50.1	46.0		44.9
Male, TOTAL	35.7	32.3	35.3	37.0	37.4	35.3	40.2	33.3	38.2	33.7	32.8	32.0
5 or less	27.5	23.9	32.5	29.8	29.8	28.0	33.1	25.6	29.5	24.2	24.6	24.7
6-10	32.1	29.2	36.9	34.7	33.9	32.9	37.9	30.4	36.0	28.9	29.4	29.5
11-15	36.9	33.2		37.3	37.3	38.7	42.5	35.2	39.4	34.6	34.4	35.6
16-20	40.1	37.5			41.1	39.7	45.3	37.5	48.6	38.7	36.9	37.2
21-25	42.2	42.1		43.9	41.8		48.4	38.2		40.1	40.8	39.7
26-30	45.8			48.5	46.2		50.2	41.0		44.5	43.7	44.5
Over 30	47.5	47.8		47.4			50.3	42.0		46.9		
Female, TOTAL	27.1	27.0	30.8	30.8	29.5	29.4	32.8	24.9	30.1	26.6	26.1	26.0
5 or less	23.6	23.7	29.8	28.2	28.0	26.3	31.1	23.6	27.1	21.8	23.0	23.2
6-10	26.8	26.2		30.6	28.9	29.1	35.1	26.5	29.8	25.9	26.4	26.9
11-15	30.3	29.2		30.3	29.5	30.3	36.1		35.6	28.6	31.0	31.3
16-20	33.1				31.3				38.2	30.4	34.8	35.3
21-25	34.5				33.2					35.0		34.5
26-30	36.8									35.4		35.3
Over 30	35.6											

*Median salaries were computed only for Ph.D.s employed full-time, excluding those in the U.S. military. Academic salaries were multiplied by 11/9 to adjust for a full-year scale. Medians were not reported for cells with less than 20 cases reporting salary or with a sampling error of more than ± $2,000.

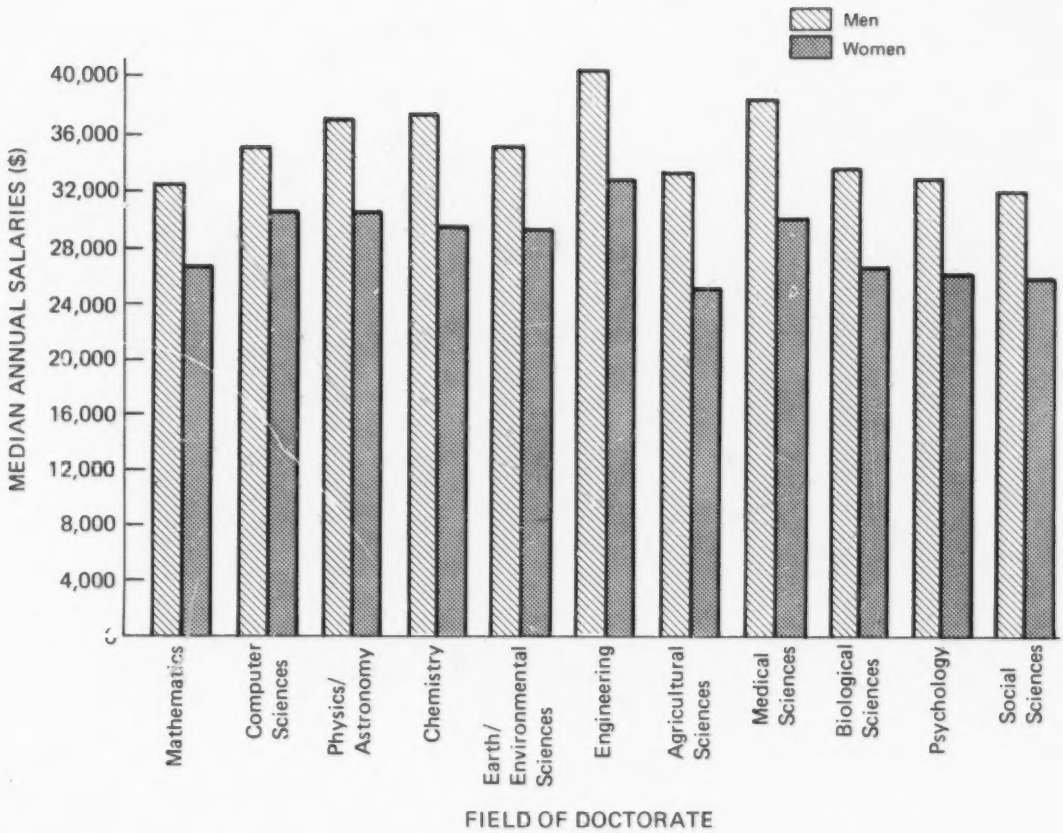

FIGURE 1.1 Median Annual Salaries of Full-Time Employed Ph.D.s in Science and Engineering by Field of Doctorate and Sex, 1981

With only a few exceptions, the median annual salaries of men and women increased with the number of years since receipt of the Ph.D. The highest median salary (approximately $50,000) was computed for male Ph.D.s in engineering who had earned their doctorates over 25 years ago. The number of women Ph.D.s in the upper age cohorts was too small to allow comparisons of salaries across fields. Interestingly, the differences in median salaries for men and women tended to increase as the number of years from Ph.D. increased. For example, the median salaries of recent male and female science/engineering Ph.D.s differ by approximately $3,900 ($27,500 for men compared to $23,600 for women). However, the salary difference between male and female Ph.D.s who had earned their degrees 11 to 15 years prior to 1981 was $6,600, and for those who had earned degrees 26-30 years ago, $9,000.

MEDIAN ANNUAL SALARY BY SEX, TYPE OF EMPLOYER, AND FIELD OF DOCTORATE

As Table 1.8 shows, doctoral scientists and engineers working for the federal government and those employed in business and industry (including self-employment) reported the highest median annual salaries, $40,400 and $40,300, respectively. Ph.D.s employed by state and local governments ($28,900) and by two-year colleges ($28,200) had the lowest median salaries for all fields combined. The highest median salaries were earned by engineering and social science Ph.D.s employed by the federal government ($44,200 each).

Men earned higher salaries than women in all employer categories. The federal government and business/industry were the highest paying employers for both sexes; men employed by the federal government had a median salary of $40,900 compared with $33,900 for women. In business and industry, men earned median salaries of $40,600, whereas women earned $32,000.

Two-year colleges were the lowest paying employers for male Ph.D.s for all fields combined. For all female Ph.D.s, state and

TABLE 1.8 Median Annual Salaries* of Full-Time Employed Doctoral Scientists and Engineers by Sex, Type of Employer, and Field of Ph.D., 1981 (in thousands of dollars)

Sex and Type of Employer	All Fields	Field of Doctorate										
		Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
TOTAL	$34.8	$31.8	$34.8	$36.9	$36.9	$34.9	$40.2	$33.1	$36.5	$32.5	$30.9	$30.9
Educational Institution	31.1	30.5	29.5	34.0	31.3	30.5	36.2	31.3	33.5	30.5	29.0	29.8
4-Year Coll/Univ/Med Sch.	31.3	30.6	29.4	34.2	31.4	30.6	36.2	31.3	33.6	30.6	28.9	29.8
2-Year College	28.2				30.0					25.8	28.0	27.1
Elem/Secondary School	29.2										30.7	
Business/Industry+	40.3	36.4	40.1	39.5	40.3	40.5	41.6	35.4	44.6	38.2	40.3	38.9
U.S. Government, Civilian	40.4	39.3			39.8	40.7	44.2	38.9	39.6	37.6		44.2
State/Local Government	28.9					27.5		30.4			27.9	29.2
Hospital/Clinic	31.1				32.6					35.4	30.1	
Other Non-Profit Organization	35.5	35.7		37.0	37.2	34.7	40.5			33.1	30.5	30.4
Male, TOTAL	35.7	32.3	35.3	37.0	37.4	35.3	40.2	33.3	38.2	33.7	32.8	32.0
Educational Institution	32.1	30.7	29.5	34.1	31.7	30.7	36.3	31.5	35.3	31.6	30.6	30.4
4-Year Coll/Univ/Med Sch.	32.2	30.8	29.5	34.3	31.8	30.7	36.3	31.5	35.4	31.8	30.7	30.5
2-Year College	28.3				30.2					25.5	27.7	
Elem/Secondary School	30.8											
Business/Industry+	40.6	36.7	40.3	39.8	40.5	40.7	41.7	35.6	45.2	39.5	40.9	
U.S. Government, Civilian	40.9				40.3	41.3	44.4	38.9	40.4	37.9		
State/Local Government	29.6					27.7		30.5			29.2	29.7
Hospital/Clinic	32.3									35.9	30.5	
Other Non-Profit Organization	36.5	36.0		37.3	37.6	35.1	40.5					
Female, TOTAL	27.1	27.0	30.8	30.8	29.5	29.4	32.8	24.9	30.1	26.6	26.1	26.0
Educational Institution	25.7	25.9	29.2	28.8	25.8	25.5	29.7	23.7	29.5	25.7	25.2	25.4
4-Year Coll/Univ/Med Sch.	25.6	26.0	29.2	29.3	25.6	25.4	29.7	23.7	29.6	25.8	24.9	25.4
2-Year College	27.1				28.0					27.2		
Elem/Secondary School	26.1										26.8	
Business/Industry+	32.0	31.9	35.6	31.8	32.2	32.7	34.4	28.0	32.6			
U.S. Government, Civilian	33.9			35.0	35.0				35.1			
State/Local Government	25.3				25.0						25.4	23.8
Hospital/Clinic	26.7										27.1	
Other Non-Profit Organization	28.4			32.8	30.3							28.5

*Median salaries were computed only for Ph.D.s employed full-time, excluding those in the U.S. military. Academic salaries were multiplied by 11/9 to adjust for a full-year scale. Medians were not reported for cells with less than 20 cases reporting salary, or a sampling error of ± $2,000.
+Includes self-employed.

local governments and four-year colleges and universities were the lowest paying employers.

GEOGRAPHIC DIFFERENCES IN EMPLOYMENT STATUS

The labor force of doctoral scientists and engineers in 1981 was approximately 340,900. Table 1.9 shows that, nationwide, 93.1 percent of the labor force were working full-time, 3.0 percent part-time, and 0.8 percent were unemployed and seeking employment. Of the 3.0 percent who were part-time employed, 0.6 percent were seeking full-time employment. The remaining 3.1 percent of the labor force held postdoctoral appointments.

In terms of regional variation, the West South Central states (Arkansas, Louisiana, Oklahoma, and Texas) reported the highest rate of full-time employment, 95.8 percent, while the Pacific states (Alaska, California, Hawaii, Oregon, and Washington) and the New England states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont) had the lowest percentage of the labor force working full-time: 90.3 and 91.3 percent, respectively.

The highest percentages of part-time employment were found in the Pacific (4.3 percent) and Mountain (4.0 percent) regions. Postdoctoral appointments were high in the New England (4.6 percent) and Pacific (4.2 percent) regions. The highest unemployment rates were reported for the Pacific (1.2 percent) and Mountain (1.1 percent) states.

The distribution of Ph.D.s in the United States by regions is shown in Figure 1.2. The largest numbers of Ph.D.s are located in the Middle and South Atlantic regions (67,900 and 64,900, respectively), and the smallest number are found in the East South Central region (15,100).

TABLE 1.9 Employment and Unemployment of Doctoral Scientists and Engineers in the U.S. Labor Force by Region,† 1981

1981 Labor Force Status	All Regions	1981 Location (Region) New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific	U.S. Possessions
Total Ph.D. Labor Force*	340,900	26,600	64,900	51,500	21,100	60,800	14,400	25,800	20,800	54,100	900
Employed Full-Time	93.1	91.3	93.1	94.5	94.4	93.4	94.4	95.8	92.7	90.3	95.7
Employed Part-Time	3.0	3.7	3.1	2.5	2.1	2.7	2.5	1.6	4.0	4.3	4.1
Seeking Full-Time Employment	0.6	0.8	0.4	0.3	0.4	0.4	0.6	0.1	0.6	1.2	0.7
Not Seeking F-T Empl./No Repl.	2.5	2.9	2.7	2.1	1.7	2.4	1.9	1.4	3.4	3.1	3.4
Postdoctoral Appointment	3.1	4.6	2.9	2.4	3.2	3.1	2.3	2.2	2.2	4.2	0.0
Unemployed and Seeking Employ	0.8	0.4	0.8	0.7	0.3	0.7	0.8	0.4	1.1	1.2	0.2

†Regions by state are as follows: New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont); Middle Atlantic (New Jersey, New York, Pennsylvania); East North Central (Illinois, Indiana, Michigan, Ohio, Wisconsin); West North Central (Iowa, Kansas, Minnesota, Missouri, North Dakota, Nebraska, South Dakota); South Atlantic (Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia); East South Central (Kentucky, Alabama, Mississippi, Tennessee); West South Central (Arkansas, Louisiana, Oklahoma, Texas); Mountain (Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming); Pacific (Alaska, California, Hawaii, Oregon, Washington).

*Includes full-time and part-time employed, postdoctoral appointees, and those unemployed and seeking employment.

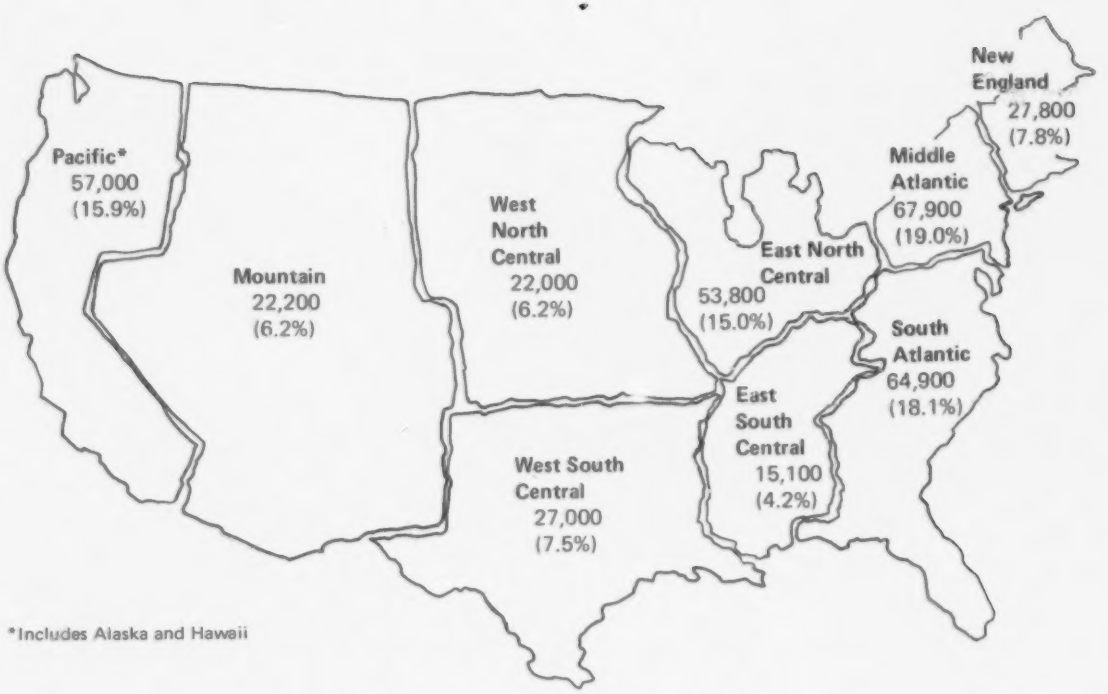

FIGURE 1.2 Regional Distribution of the U.S. Population of Doctoral Scientists and Engineers and Percentage Distribution of the Total Ph.D. Population, 1981 (estimated population of 1938-1980 S/E Ph.D.s in the U.S. = 357,700 excluding 900 in U.S. possessions)

TABLE 1.10 Employment and Unemployment of Doctoral Scientists and Engineers in the U.S. Labor Force by Sex and Field of Ph.D., 1981

1981 Labor Force Status/Sex	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
TOTAL Ph.D. Labor Force*	340,900	18,200	2,200	28,300	45,000	11,900	51,600	15,100	10,600	60,500	45,500	52,000
Employed Full-Time	93.1	96.6	97.2	94.9	93.7	93.6	97.7	97.4	89.6	86.3	90.2	95.4
Employed Part-Time	3.0	1.8	1.4	1.3	2.4	4.1	1.8	1.2	2.9	3.1	6.9	3.1
Seeking Full-Time Employment	0.6	0.2	1.0	0.1	3.3	0.8	0.2	0.2	0.3	0.8	1.1	0.6
Not Seeking F-T Empl./No Rept.	2.5	1.6	0.4	1.3	2.1	3.3	1.6	1.0	2.6	2.4	5.8	2.4
Postdoctoral Appointment	3.1	1.0	1.2	3.2	3.2	1.5	0.4	1.0	6.7	9.1	1.8	0.7
Unemployed and Seeking Employ	0.8	0.5	0.2	0.6	0.7	0.8	0.1	0.4	0.7	1.5	1.1	0.8
Ph.D. Labor Force,* Male	300,100	16,700	2,000	27,500	41,800	11,300	51,100	14,700	8,800	49,500	33,300	43,400
Employed Full-Time	94.9	97.2	97.4	95.2	94.6	94.2	97.8	97.8	91.5	89.6	93.7	97.1
Employed Part-Time	2.0	1.3	1.3	1.1	1.9	3.7	1.7	1.0	2.1	1.8	3.6	2.1
Seeking Full-Time Employment	0.4	0.1	1.1	0.1	0.2	0.7	0.2	0.1	0.3	0.3	0.7	0.6
Not Seeking F-T Empl./No Rept.	1.6	1.2	0.2	1.0	1.6	3.1	1.5	0.9	1.8	1.4	2.9	1.6
Postdoctoral Appointment	2.6	1.0	1.3	3.2	2.9	1.3	0.4	0.8	6.1	7.6	1.7	0.4
Unemployed and Seeking Employ	0.6	0.5	0.1	0.5	0.6	0.7	0.1	0.4	0.3	1.0	1.0	0.3
Ph.D. Labor Force,* Female	40,800	1,500	200	800	3,200	600	500	400	1,800	11,000	12,200	8,600
Employed Full-Time	80.1	90.2	94.9	84.4	81.2	81.6	89.7	83.0	80.3	71.5	80.8	86.6
Employed Part-Time	10.7	7.7	3.4	9.4	9.3	11.4	7.9	7.1	7.0	8.8	16.0	8.0
Seeking Full-Time Employment	1.9	1.5	0.0	1.0	1.4	4.3	0.0	1.6	0.6	2.1	2.1	1.1
Not Seeking F-T Empl./No Rept.	5.6	6.2	3.4	5.4	7.9	7.1	7.9	5.3	6.4	6.8	13.9	5.9
Postdoctoral Appointment	6.7	0.9	0.0	4.4	7.4	5.3	1.6	8.4	9.9	16.0	2.0	2.3
Unemployed and Seeking Employ	2.4	1.2	1.7	1.8	2.1	1.7	0.8	1.5	2.8	3.7	1.2	3.1

*Includes full-time and part-time employed, postdoctoral appointees, and those unemployed and seeking employment.

EMPLOYMENT STATUS BY SEX AND FIELD OF DOCTORATE

Less than 1 percent of the total labor force of doctoral scientists and engineers in the United States were unemployed and seeking work in 1981. However, the unemployment rate differed according to sex: for men it was 0.6 percent compared with 2.4 percent for women (Table 1.10). These percentages are not greatly different from those of the 1979 survey which showed an unemployment rate of 0.7 percent for males and 2.8 percent for females.

Female Ph.D.s were more frequently unemployed and seeking employment than were male Ph.D.s. This was especially evident in the social sciences and the biological sciences, where 3.1 and 3.7 percent of the female Ph.D.s were unemployed and seeking work, compared with 0.3 and 1.0 percent of the males.

Across all fields, the percentage of Ph.D.s in full-time employment was greater for men than it was for women. Of the approximately 300,100 male science and engineering Ph.D.s in the labor force, 94.9 percent held full-time jobs, and only 2.0 percent worked part-time. For women, however, only 80.1 percent of a labor force of approximately 40,800 were employed full-time, while 10.7 percent had part-time jobs. These figures indicate no significant change from 1979, and may, in part, reflect the need for female Ph.D.s to work part-time due to family constraints.

Biological sciences had the highest percentage of Ph.D.s on postdoctoral appointments for both sexes across all fields. As many as 16.0 percent of the women who had Ph.D.s in the biological sciences were on postdoctoral appointments in 1981, compared with 7.6 percent of the male biologists.

ACADEMIC POSITION BY COHORT, FIELD OF DOCTORATE, AND SEX

The percentage of science and engineering Ph.D.s with the academic rank of full professor was greater for men than for women as

TABLE 1.11 Academic Position of Doctoral Scientists and Engineers by Year of Ph.D., Field of Ph.D., and Sex, 1981

	Field of Doctorate/Sex							
	All Fields		EMP		Life Sciences		Behav/Soc Sci	
1981 Academic Position	M	F	M	F	M	F	M	F
Total, 1938-1959 Ph.D.s	31,500	2,300	13,300	500	9,700	1,000	8,500	800
Faculty	92.3	82.3	88.3	82.1	95.3	77.9	95.0	87.5
Professor	84.8	58.0	80.1	60.0	87.0	49.2	89.3	66.9
Associate Professor	6.7	19.1	6.8	15.2	8.0	21.9	5.1	18.4
Assistant Professor	0.3	2.9	0.4	2.8	0.2	4.5	0.3	1.1
Instructor	0.4	2.3	0.9	4.1	0.1	2.4	0.2	1.1
Nonfaculty	2.9	7.2	5.8	7.9	1.1	9.4	0.5	4.2
Teaching Staff*	0.2	0.8	0.1	0.4	0.3	0.5	0.3	1.5
Research Staff†	2.7	6.4	5.7	7.5	0.8	6.9	0.2	2.8
Postdoctoral Appointment	0.1	0.1	0.1	0.4	0.1	0.0	0.2	0.0
Other/No Report	4.7	10.4	5.8	9.6	3.5	12.7	4.3	8.2
Total, 1960-1969 Ph.D.s	54,000	5,200	25,100	1,000	14,200	1,900	14,700	2,300
Faculty	92.6	83.7	89.4	78.6	94.2	80.9	96.8	88.4
Professor	62.8	36.5	62.2	39.7	59.3	27.7	67.0	47.2
Associate Professor	27.0	33.6	24.2	34.0	31.2	34.2	27.5	32.8
Assistant Professor	2.3	11.7	2.0	11.3	2.8	17.4	2.3	6.8
Instructor	0.6	1.9	0.9	3.6	0.6	1.3	0.0	1.5
Nonfaculty	3.3	6.8	4.9	8.6	2.9	9.8	0.9	3.5
Teaching Staff*	0.2	1.3	0.2	1.4	0.2	1.4	0.3	1.1
Research Staff†	3.0	5.6	4.7	7.2	2.7	8.4	0.6	2.4
Postdoctoral Appointment	0.4	1.8	0.6	2.9	0.2	2.9	0.2	0.2
Other/No Report	3.7	7.7	5.2	9.9	2.7	6.3	2.1	7.9
Total, 1970-1974 Ph.D.s	36,400	6,500	13,400	1,000	10,600	2,300	12,400	3,200
Faculty	86.6	81.5	79.9	76.2	90.1	77.7	90.9	85.8
Professor	17.4	9.2	14.6	7.8	12.2	6.0	25.0	11.8
Associate Professor	50.8	38.2	50.4	34.0	50.1	33.9	51.2	42.5
Assistant Professor	17.3	31.6	14.3	27.9	26.2	35.7	13.0	29.8
Instructor	1.1	2.9	0.7	6.3	1.7	2.3	1.1	1.6
Nonfaculty	7.4	8.7	13.4	12.6	4.4	12.4	3.4	4.9
Teaching Staff*	0.6	1.0	0.5	2.0	0.4	0.5	0.9	1.1
Research Staff†	6.7	7.7	12.8	10.5	4.0	11.9	2.5	3.8
Postdoctoral Appointment	1.1	2.6	1.1	3.9	1.8	4.7	0.6	0.6
Other/No Report	4.9	7.2	5.6	7.4	3.7	5.2	5.2	8.7
Total, 1975-1980 Ph.D.s	35,100	10,200	11,800	1,100	11,400	3,800	11,900	5,300
Faculty	69.3	64.1	66.2	63.5	57.8	46.9	83.4	76.5
Professor	0.8	2.0	1.0	1.0	0.7	1.5	0.6	2.7
Associate Professor	12.8	9.8	12.1	6.7	7.3	7.1	18.6	12.5
Assistant Professor	53.2	47.5	51.0	51.2	46.7	33.5	61.5	56.6
Instructor	2.6	4.8	3.1	4.7	1.0	4.8	2.7	4.7
Nonfaculty	9.1	8.8	13.2	14.7	7.5	7.9	6.7	8.2
Teaching Staff*	0.4	1.6	0.4	1.0	0.4	0.8	0.4	2.2
Research Staff†	8.7	7.3	12.8	13.7	7.0	7.2	6.3	5.9
Postdoctoral Appointment	16.7	19.7	16.2	16.9	30.5	39.7	3.9	6.0
Other/No Report	4.9	7.4	4.4	4.9	4.2	5.5	5.9	9.3

*Includes nonfaculty staff members whose primary work activity is teaching.

†Includes nonfaculty staff members whose primary work activity is basic research, applied research, development, or design.

NOTE: EMP = Engineering, Mathematics, Computer Sciences, Physics/Astronomy, Chemistry and Earth/Environmental Sciences.

Life Sciences = Agricultural Sciences, Medical Sciences, and Biological Sciences.

Behav/Soc Sci = Psychology and Social Sciences.

of 1981 (Table 1.11). However, in the recent cohort (1975-1980), the percentage of females with full professor rank was equal to or slightly higher than that for males. Individuals in the behavioral sciences, except for the 1975-1980 cohort of male Ph.D.s, attained the rank of full professor more frequently than Ph.D.s in other fields. For both men and women, the percentages of Ph.D.s with the rank of associate and assistant professor were greatly dependent on year and field of Ph.D. For example, higher percentages of 1938-1959 and 1960-1969 Ph.D. women were associate professors than were men in the same cohort groupings. However, for the 1970-1974 cohort, much larger percentages of men than women were associate professors. Larger percentages of women than men were assistant professors in all but the most recent cohort, where the reverse was true.

In the recent cohort (1975-1980) where, as expected, the percentage of Ph.D.s on postdoctoral appointments was high, women reported a slightly higher rate of postdoctoral appointments than men: 19.7 percent for women and 16.7 percent for men, across all fields.

The percentage of female Ph.D.s in nonfaculty positions was similar across all cohort groups and fields. The percentage of men in nonfaculty positions, however, appears to be significantly related to the number of years since receipt of Ph.D. (2.9 percent for the 1938-1959 cohort, 3.3 percent for the 1960-1969 cohort, 7.4 percent for the 1970-1974 Ph.D.s, and 9.1 percent for the 1975-1980 doctorates).

TENURE STATUS BY FIELD, SEX, AND AGE

Much smaller percentages of women than men held tenured positions, 37.6 percent for women versus 64.6 percent for men for all fields combined (Table 1.12). Similar differences occurred in each field and age group. Women were also much more likely than men to hold non-tenure track positions (28.9 percent compared with 13.2 percent).

TABLE 1.12 Tenure Status of Academically Employed Science and Engineering Ph.D.s by Field of Doctorate, Age, and Sex, 1981

	Field of Doctorate/Sex							
	All Fields		EMP		Life Sciences		Behav/Soc Sci	
Age and Tenure Status	M	F	M	F	M	F	M	F
Total Academically Employed (N)	157,000	24,200	63,600	3,600	45,900	9,000	47,500	11,600
Tenured	64.6	37.6	65.3	39.8	60.1	29.6	67.9	43.1
Not Tenured	29.1	51.7	25.6	50.2	34.2	58.7	28.6	46.8
Tenure Track	15.9	22.8	13.5	21.2	17.3	19.4	17.6	25.9
Non-Tenure Track	13.2	28.9	12.1	29.1	16.9	39.3	11.0	20.8
No Report	6.4	10.7	9.1	9.9	5.6	11.7	3.5	10.1
Age - 35 or Under (N)	31,200	7,700	11,300	1,000	10,400	3,000	9,500	3,700
Tenured	13.3	9.4	12.9	10.1	9.0	4.3	18.5	13.3
Not Tenured	77.2	77.6	76.5	80.6	79.4	80.6	75.6	74.4
Tenure Track	46.8	37.2	47.0	41.1	40.3	24.3	53.6	46.6
Non-Tenure Track	30.4	40.4	29.5	39.5	39.1	56.3	22.1	27.8
No Report	9.5	13.0	10.7	9.2	11.6	15.1	5.8	12.4
Age - 36 to 45 (N)	60,800	9,200	26,100	1,500	17,200	3,300	17,500	4,400
Tenured	66.5	41.0	68.3	40.9	60.0	30.7	70.4	48.8
Not Tenured	26.5	48.6	22.2	48.6	34.2	58.7	25.5	40.9
Tenure Track	14.3	21.7	10.7	18.1	19.5	23.3	14.7	21.6
Non-Tenure Track	12.2	26.9	11.5	30.5	14.7	35.3	10.9	19.3
No Report	6.9	10.4	9.6	10.5	5.8	10.6	4.1	10.3
Age - 46 or Older (N)	65,000	7,300	26,200	1,100	18,300	2,700	20,500	3,500
Tenured	87.3	63.4	84.9	66.0	89.3	56.6	88.7	67.7
Not Tenured	8.3	28.1	7.2	24.3	8.6	34.3	9.5	24.7
Tenure Track	2.5	6.9	1.9	6.6	2.3	9.1	3.5	9.4
Non-Tenure Track	5.8	19.3	5.3	17.6	6.3	25.1	6.0	15.3
No Report	4.4	8.5	7.9	9.7	2.1	9.1	1.9	7.5

NOTE: EMP = Engineering, Mathematics, Computer Sciences, Physics/Astronomy, Chemistry and Earth/Environmental Sciences.
Life Sciences = Agricultural Sciences, Medical Sciences, and Biological Sciences.
Behav/Soc Sci = Psychology and Social Sciences.

The smallest difference in tenure rates by sex was among Ph.D.s who were 35 years of age or younger, where 13.3 percent of the men were tenured compared with 9.4 percent of the women. However, within this same age group, much larger percentages of women were in non-tenure track positions (40.4 percent of the women compared with 30.4 percent of the men). This could be attributable to the fact that women, because of family or marital constraints, appear to be more willing or able than men to accept part-time and/or non-tenure track positions in academe.

For both sexes, the life sciences had the smallest percentage of Ph.D.s who were tenured and also the largest percentage of doctorate recipients who were in non-tenure track positions.

CHAPTER II

HUMANITIES

DOCTORAL POPULATION BY FIELD

This chapter covers nine categories of humanities Ph.D. fields: art history, classical languages, English/American literature, history, modern languages and literature, music, philosophy, speech/theater, and "other humanities."

The employment data, unless otherwise indicated, include those Ph.D.s who were on postdoctoral appointments as well as those who were full-time and part-time employed during February 1981. Ph.D.s who were retired or unemployed in February 1981 are excluded from the employment estimates.

Table 2.1 gives the distribution of 1938-1980 humanities Ph.D.s in the United States by field of doctorate and field of employment as of February 1981.[22] Also given in Table 2.1 are the percentages of these humanities Ph.D.s who were employed only in the humanities fields.

Approximately 76,000 humanists earned their doctoral degrees between January 1, 1938 and June 30, 1980. The fields with the largest number and percentage of doctorate recipients were English/American literature (28.0 percent), history (26.7 percent), and modern languages (18.6 percent). Although the number employed in each Ph.D. field was smaller than the number of individuals awarded Ph.D.s, the humanities fields with the highest percentages of employment were English/American literature (21.2 percent) and history (18.9 percent). It should be noted, however, that 17.1 percent of the employed humanities Ph.D.s were employed in nonhumanities fields.

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[22]Individuals who earned Ph.D.s in the humanities between January 1, 1938 and June 30, 1980 are included in chapter II tables. For estimates of Ph.D.s who earned their degrees between July 1, 1980 and January 30, 1981, see Appendix B.

TABLE 2.1 Distribution of Ph.D.s in the Humanities in the United States, 1938-1980 Graduates by Field of Doctorate and Field of Employment, 1981

	Field of Doctorate		Field of Employment		
	N	%	N*	% of Total Employed	% of Humanities-Employed+
All Fields (N)	76,000	100.0	68,600	100.0	100.0
History	20,300	26.7	13,000	18.9	24.5
Art History	2,000	2.7	1,800	2.6	3.3
Music	5,100	6.8	4,200	6.1	7.9
Speech/Theater	3,300	4.3	2,000	2.9	3.7
Philosophy	6,100	8.1	4,000	5.9	7.6
Other Humanities	2,000	2.6	2,900	4.3	5.5
English/American Languages and Literature	21,300	28.0	14,500	21.2	27.4
Classical Languages and Literature	1,800	2.3	1,100	1.6	2.1
Modern Languages and Literature	14,100	18.6	9,600	14.0	18.1
Nonhumanities			11,700	17.1	
No Report			3,800	5.5	

*Includes postdoctoral appointees as well as full-time and part-time employed Ph.D.s.
+Percentages are based on the estimated number of individuals employed in the humanities (N = 53,100).

A comparison between field of doctorate and field of employment for the humanities shows that net losses occurred from field of Ph.D. degree to field of employment in all disciplines except "other humanities"[23] which showed an increase of 900 Ph.D.s from field of doctorate to field of employment. There were substantial net losses in the fields of history and English/American literature (7,300 and 6,800, respectively). The decline in numbers from Ph.D. field to employment field was, in part, due to the number of humanists (3,200) who left their specialty field to enter the education employment field.[24]

[23]"Other humanities" consist of library sciences, general humanities, and other humanities.

[24]Appendix H provides further statistics on the estimated number of Ph.D.s in the humanities who were employed in each field category, and shows how the 17.1 percent employed in the nonhumanities category were distributed.

TABLE 2.2 Field Mobility of Employed Ph.D.s in the Humanities, 1981

		Field of Doctorate								
1981 Field of Employment	Total Employed[+]	Hist	Art Hist	Music	Speech/ Theater	Phil	Other Humn	Eng/ Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
All Fields (N)	68,600	18,500	1,800	4,700	2,900	5,700	1,800	19,100	1,600	12,500
History	18.9	68.7	0.3	0.1	0.0	0.0	2.6	0.6	1.8	0.6
Art History	2.6	0.3	87.0	0.1	0.0	0.4	3.8	0.1	0.2	0.1
Music	6.1	0.1	0.0	87.2	0.0	0.4	0.3	0.0	0.0	0.2
Speech/Theater	2.9	0.1	0.0	0.1	62.4	0.0	1.1	0.5	0.0	0.2
Philosophy	5.9	0.1	0.0	0.0	0.0	70.4	0.0	0.0	0.7	0.2
Other Humanities	4.3	3.9	2.3	1.7	1.3	1.4	50.1	3.6	2.8	2.9
English/American Lang. & Lit.	21.2	0.9	0.0	0.1	3.4	0.6	7.8	76.9	1.8	4.3
Classical Languages & Lit.	1.6	0.0	0.0	0.0	0.0	0.0	0.3	0.0	66.1	0.4
Modern Languages & Literature	14.0	0.2	0.0	*	0.3	0.3	7.0	1.8	2.7	71.9
Nonhumanities	17.1	20.3	5.7	6.7	26.0	21.0	24.4	17.5	18.2	12.1
No Report	5.5	5.5	4.7	3.9	6.6	5.5	2.8	5.0	5.8	7.0

[+]Includes postdoctoral appointees as well as full-time and part-time employed Ph.D.s.
*Less than 0.1 percent.

FIELD MOBILITY[25] OF EMPLOYED PH.D.S

Ninety percent of the 76,000 Ph.D.s in the humanities who received their doctorates between January 1, 1938 and June 30, 1980 were employed in February 1981. Data on the relationship between field of employment and field of doctorate for these humanists are given in Table 2.2.

The Ph.D. fields retaining the highest percentages of their graduates in the corresponding employment fields were music (87.2 percent) and art history (87.0 percent). The field having the lowest retention rate was "other humanities" where only 50.1 percent of the Ph.D.s remained in the same employment field as their Ph.D. field.

Those who left their Ph.D. field for employment in another field moved frequently into nonhumanities fields. For example, over one-quarter of the Ph.D.s in speech/theater were employed in nonhumanities fields in 1981.[26]

DEMOGRAPHIC CHARACTERISTICS BY FIELD OF DOCTORATE

Of the humanities Ph.D.s in the United States in February 1981, 72.8 percent were men and 27.2 percent were women (Table 2.3). All fields had higher percentages of male Ph.D.s, although women were highly represented in the fields of art history (46.3 percent) and

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[25] Field mobility is defined as being employed in a field other than one's doctoral field.

[26] For purposes of this report, only individuals who identified their doctoral degree as "speech as a dramatic art" (code 831) or "theater and theater criticism" (code 809) are included in the humanities field category "speech/theater." Ph.D.s in the related field of "communications" (code 708) are included in the science chapter under the social sciences, and those in "speech and hearing sciences" (code 885), a professional field, are outside the scope of this report. See Appendix I for additional information.

TABLE 2.3 Demographic Characteristics of Ph.D.s in the Humanities by Field of Doctorate, 1981

Demographic Characteristics	All Fields	Field of Doctorate: Hist	Art Hist	Music	Speech/ Theater	Phil	Other Humn	Eng/ Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
Total Population (N)	76,000	20,300	2,000	5,100	3,300	6,100	2,000	21,300	1,800	14,100
	%	%	%	%	%	%	%	%	%	%
Sex										
Male	72.8	83.7	53.7	80.6	77.6	85.8	66.1	67.4	69.7	60.0
Female	27.2	16.3	46.3	19.4	22.4	14.2	33.9	32.6	30.3	40.0
Racial/Ethnic Group										
White	92.1	92.8	93.8	93.9	91.2	91.9	85.0	95.3	94.7	86.3
Minority Group	5.9	4.7	4.3	5.5	4.5	5.2	11.9	3.2	1.9	12.2
Hispanic	2.8	1.4	0.9	1.0	0.6	2.0	2.5	1.1	0.7	9.3
Black	1.5	1.9	0.7	3.0	2.2	0.8	2.6	1.1	1.0	1.2
Asian	1.1	0.9	2.0	0.8	0.8	2.0	5.8	0.5	0.1	1.3
American Indian	0.5	0.4	0.8	0.6	0.9	0.4	1.0	0.5	0.1	0.5
No Report	2.1	2.5	1.9	0.6	4.3	2.9	3.2	1.5	3.4	1.5
Age in 1981										
Under 30	0.5	0.5	0.2	0.9	0.3	1.4	0.0	0.2	0.9	0.6
30-34	9.1	7.0	11.1	12.5	6.3	11.7	5.5	9.3	10.5	10.0
35-39	20.2	19.8	26.3	19.3	14.4	23.2	12.5	20.9	22.5	19.8
40-44	20.1	22.1	17.6	17.8	16.2	16.4	25.3	20.6	17.0	19.8
45-49	13.9	14.7	12.4	15.9	14.6	13.0	17.9	12.4	15.1	14.2
50-54	11.2	11.0	9.5	12.2	14.8	10.8	16.0	11.1	6.9	11.0
55-59	9.3	8.9	7.8	6.9	13.4	11.0	10.2	9.8	7.3	8.9
60-64	6.5	7.0	4.7	7.0	10.8	6.7	5.4	6.0	7.7	5.8
Over 64	9.1	9.1	10.4	7.4	9.1	6.0	7.2	9.7	12.1	9.8
No Report	0.1	*	0.0	0.2	0.2	0.0	0.1	0.1	0.0	0.1
Median Age (Years)	45	45	43	44	49	44	46	44	44	44
Calendar Year of Ph.D.										
1938-1949	5.5	6.2	3.3	2.1	3.6	5.5	2.2	5.8	12.8	5.6
1950-1959	12.2	13.9	10.0	10.2	14.1	12.9	7.0	12.1	12.4	10.9
1960-1969	26.5	26.6	20.2	20.7	34.5	27.7	26.9	28.2	29.5	24.0
1970-1973	22.3	22.5	20.4	21.2	21.7	22.0	24.4	22.0	21.6	23.2
1974-1977	22.4	20.6	28.4	26.6	15.4	21.9	27.4	22.1	17.2	24.6
1978-1980[+]	11.1	10.1	17.7	19.1	10.6	10.0	12.2	9.8	6.6	11.7
Citizenship										
U.S.	96.8	98.4	92.5	98.4	98.0	96.6	94.5	98.7	96.2	92.1
Foreign[#]	2.7	1.0	5.8	1.4	0.9	2.6	5.5	1.0	2.9	7.5
No Report	0.5	0.6	1.7	0.1	1.1	0.8	0.0	0.2	0.9	0.4

*Less than 0.1 percent.

[+]Excludes Ph.D.s awarded in July-December, 1980. See Appendix B for the demographic characteristics of Ph.D. humanists who received their degrees between July 1, 1980 and January 31, 1981.

[#]In view of the lack of a comprehensive sampling frame for foreign-earned Ph.D.s in the United States, the number of humanities Ph.D.s who are foreign citizens may be somewhat underestimated.

modern languages (40.0 percent). The difference in the proportion of males to females was greatest in philosophy (85.8 to 14.2 percent), history (83.7 to 16.3 percent), music (80.6 to 19.4 percent), and speech/theater (77.6 to 22.4 percent).

Members of racial/ethnic minority groups (i.e., Blacks, American Indians, Asians, and Hispanics) comprised 5.9 percent of the humanities doctoral population; this figure has increased 0.6 percentage points since 1979. Fields with relatively high percentages of minority group members were "other humanities" (11.9 percent) and modern languages and literature (12.2 percent). The latter field also had the largest number of minorities, 1,700. Fewer than 100 minority Ph.D. recipients, however, were reported to be in the fields of art history and classical languages and literature.

The median age of humanities Ph.D.s in February 1981 was 45 years. In art history and philosophy, over 35 percent of the Ph.D.s were under 40 years of age compared with only 18 percent of the Ph.D.s in "other humanities" and 21 percent of the speech/theater Ph.D.s As many as one out of every five Ph.D.s in the fields of speech/theater and classical languages and literature were over 60 years of age.

The distribution of years in which the Ph.D.s were awarded indicates the relative growth of the humanities fields over the years. More than half (55.8 percent) of the humanists received their degrees since 1970. The fields of music (66.9 percent), art history (66.5 percent) and "other humanities" (64.0 percent) have shown substantial growth since 1970. The fields with the slowest rates of growth since 1970 were classical languages and literature and speech/theater (45.4 and 47.7 percent, respectively). This continues the growth trends demonstrated in the 1979 survey data.

Only 2.7 percent of the humanities Ph.D.s in the United States in 1981 were foreign citizens.[27] These foreign citizens were most

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[27]Due to the lack of a comprehensive sampling frame for foreign earned Ph.D.s in the United States, the percentage of humanities Ph.D.s who are foreign citizens may be somewhat low.

highly represented in the fields of modern languages and literature (7.5 percent), art history (5.8 percent), and "other humanities" (5.5 percent). In contrast, only about one percent of the Ph.D.s in speech/theater, history, and English/American literature were foreign citizens.

EMPLOYMENT STATUS BY FIELD OF DOCTORATE

Approximately 63,500 (83.6 percent) of the 76,000 humanities Ph.D.s in the United States were employed in full-time positions in February 1981 (Table 2.4A). An additional 4,600 (6.0 percent) humanists reported that they were employed on a part-time basis, and only 500 (0.7 percent) indicated that they held postdoctoral appointments.[28]

The 1981 humanities doctoral labor force, consisting of 69,700 individuals or 91.7 percent of the total population of Ph.D. humanists, includes those humanities Ph.D.s who were unemployed and seeking employment (1,100), together with those who were employed full-time and part-time and those on postdoctoral appointments. Those Ph.D.s who indicated they were unemployed and not seeking employment, retired, specified "other," or gave no report for their employment status, made up the remainder of the humanities population (6,300 or 8.3 percent of the total population of Ph.D. humanists). These employment status figures show little change from the 1979 survey data. Compared to 1979 figures, the percentage of humanities Ph.D.s who were employed full-time was somewhat higher in 1981 (81.6 percent in 1979 and 83.6 percent in 1981).

Ph.D.s in philosophy and those in "other humanities" had the highest percentage of full-time employment (approximately 86 percent

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[28] This category includes postdoctoral fellowships, traineeships, research associateships, and internships.

TABLE 2.4A Employment Status of Ph.D.s in the Humanities by Field of Doctorate, 1981 (1938-1980 Graduates)

1981 Employment Status	All Fields	Field of Doctorate: Hist	Art Hist	Music	Speech/ Theater	Phil	Other Humn	Eng/ Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
Total Population (N)	76,000	20,300	2,000	5,100	3,300	6,100	2,000	21,300	1,800	14,100
Employed Full-Time	83.6	84.9	77.1	82.8	83.8	85.7	85.9	83.8	81.5	81.5
Employed Part-Time	6.0	5.5	7.5	8.7	5.0	6.0	4.3	5.5	6.7	6.5
Postdoctoral Appointment[+]	0.7	0.8	2.1	0.3	1.0	0.8	0.7	0.4	0.9	0.8
Not Employed	9.2	8.5	12.4	7.8	10.0	6.8	7.7	9.3	10.8	10.8
Seeking Employment[#]	1.4	1.1	3.8	2.1	0.7	0.6	3.2	1.1	1.8	1.9
Not Seeking Employment	1.7	1.6	2.7	0.6	1.7	2.2	1.0	1.8	2.6	1.8
Retired	5.9	5.6	5.4	5.0	7.6	4.0	3.5	6.2	6.5	6.7
Other	0.2	0.2	0.5	0.2	0.0	0.1	0.0	0.1	0.0	0.3
No Report	0.6	0.3	0.9	0.5	0.2	0.7	1.4	0.9	0.2	0.4

[+]The percentages of postdoctoral appointees may be underestimated because information about foreign Ph.D.s who came to the U.S. for postdoctoral research or study is incomplete.

[#]Percentages are not unemployment rates because they are calcuiated on the total population, which includes those retired, those not seeking employment, and those not reporting status, none of whom are part of the labor force. For unemployment rates, see Tables 2.9 and 2.10.

TABLE 2.4B Employment Status of Ph.D.s in the Humanities by Field of Doctorate, 1981 (1975-1980 Graduates)

1981 Employment Status	All Fields	Field of Doctorate: Hist	Art Hist	Music	Speech/ Theater	Phil	Other Humn	Eng/ Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
Total Population (N)	21,000	5,100	800	2,100	700	1,600	700	5,500	300	4,200
Employed Full-Time	84.0	84.7	75.0	81.8	87.1	81.4	89.1	86.1	84.7	83.0
Employed Part-Time	8.2	6.3	10.3	13.9	8.2	8.8	5.6	6.3	9.1	9.8
Postdoctoral Appointment[+]	0.9	0.9	3.4	0.4	0.6	2.7	2.1	0.2	0.0	0.9
Not Employed	6.3	7.5	9.8	3.8	4.2	6.1	2.9	6.8	5.4	6.0
Seeking Employment[#]	2.5	3.1	5.2	2.6	2.1	0.6	2.4	1.7	3.4	3.2
Not Seeking Employment	3.3	4.1	4.0	0.8	2.1	4.4	0.5	4.1	1.4	2.5
Retired	0.3	0.0	0.0	0.2	0.0	1.0	0.0	0.5	0.6	0.1
Other	0.3	0.3	0.6	0.2	0.0	0.0	0.0	0.5	0.0	0.1
No Report	0.6	0.7	1.6	0.1	0.0	1.1	0.3	0.6	0.9	0.3

[+]The percentages of postdoctoral appointees may be underestimated because information about foreign Ph.D.s who came to the U.S. for postdoctoral research or study is incomplete.

[#]Percentages are not unemployment rates because they are calculated on the total population, which includes those retired, those not seeking employment, and those not reporting status, none of whom are part of the labor force. For unemployment rates, see Tables 2.9 and 2.10.

each, compared to 1979 figures of 80 and 84 percent, respectively), while only 77 percent of the Ph.D.s in art history were employed on a full-time basis.

A relatively large percentage of music (8.7 percent) Ph.D.s were employed part-time. As many as 12.4 percent of the art history Ph.D.s were not employed, though only 3.8 percent of these were seeking employment. The field of art history also had the highest percentage of its Ph.D.s holding postdoctoral appointments in 1981 (2.1 percent).

Although the percentage of full-time employed humanists was similar for the 1938-1980 population and for the recent 1975-1980 Ph.D. group, there were exceptions by field (Table 2.4B). For example, a higher percentage of 1938-1980 philosophy Ph.D.s were employed full-time than were the 1975-1980 Ph.D.s (a differential of 4.3 percentage points). However, for Ph.D.s in classical languages and literature and "other humanities," the reverse was true. Higher percentages of the recent Ph.D.s in these fields were employed full-time than were their counterparts in the total Ph.D. group (a differential of 3.2 percentage points).

Recent Ph.D.s with degrees in music had the highest percentage of part-time employment (13.9 percent), continuing the employment trend for the total music doctoral population. As was true for the 1938-1980 art history Ph.D.s, recent degree recipients in art history also had a relatively high percentage of postdoctoral appointments (3.4 percent). It should also be noted that the percentage of recent Ph.D.s unemployed and seeking employment was again highest for those in art history (3.8 percent of the total population of art historians, and 5.2 percent of the recent Ph.D. cohort).[29]

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[29]These figures are not unemployment rates since they are based on the total population. The unemployment rate is the ratio of Ph.D.s who are unemployed and seeking employment to the number of Ph.D.s in the humanities labor force -- a ratio of 1,100 to 69,700, or 1.5 percent. Unemployment rates are shown in Table 2.10.

TYPE OF EMPLOYER BY FIELD OF DOCTORATE

Humanities Ph.D.s in the United States who were full-time or part-time employed totaled 68,100 in 1981. An estimated 85.4 percent of these individuals were working in educational institutions, including 7.6 percent who reported two-year colleges or elementary and secondary schools as their principal employer.

Business and industry (including self-employment) attracted 6.7 percent of the humanities doctorates. The category "other humanities," which includes, among other fields, Ph.D.s in library science, had the largest proportion of Ph.D.s (12.8 percent) working in business and industry. Only 3.5 percent of the humanists were employed by the government (federal, state, and local), although history Ph.D.s reported a much higher incidence of government employment than did other humanities fields (6.9 percent). Among recent Ph.D.s (1975-1980), only 5.3 percent of all humanists reported that they worked for the government, but 11.5 percent of the history Ph.D.s were so employed (Table 2.5B).

In comparison with the 1938-1980 humanities Ph.D.s, the recent doctorate recipients were less likely to be working in four-year colleges and universities and more likely to be employed in two-year colleges and elementary and secondary schools. This held true for all fields except speech/theater, where 1.4 percent more of the recent doctorates were employed at four-year colleges and universities.

TABLE 2.5A Type of Employer of Full-Time and Part-Time Employed Ph.D.s in the Humanities by Field of Doctorate, 1981 (1938-1980 Graduates)

		Field of Doctorate								
1981 Type of Employer	All Fields	Hist	Art Hist	Music	Speech/ Theater	Phil	Other Humn	Eng/ Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
Employed Population[+] (N)	68,100	18,400	1,700	4,700	2,900	5,600	1,800	19,000	1,600	12,400
Educational Institution	85.4	81.3	81.8	84.4	87.3	87.0	80.3	87.8	84.8	88.3
4-Year Coll/Univ/Med Sch.	77.8	72.1	79.9	77.7	80.7	82.6	74.7	79.8	77.1	80.6
2-Year College	4.9	6.0	1.4	4.8	5.6	3.7	2.5	5.6	1.0	3.9
Elem/Secondary School	2.7	3.2	0.5	2.0	1.0	0.7	3.1	2.4	6.8	3.8
Business/Industry[#]	6.7	5.4	5.4	7.5	5.3	6.2	12.8	7.9	7.6	6.1
U.S. Government	2.0	4.4	2.9	0.9	0.6	1.5	1.8	0.8	0.7	1.5
State/Local Government	1.5	2.5	1.8	0.5	1.1	1.0	1.6	1.4	0.7	1.1
Hospital/Clinic	0.1	0.2	0.0	0.0	0.3	0.7	0.1	*	0.0	0.1
Other Non-Profit Organization	3.3	4.9	6.7	6.0	3.6	3.1	3.0	1.6	4.8	1.8
Other	0.3	0.5	0.7	0.0	0.3	0.1	0.5	*	0.8	0.5
No Report	0.6	0.9	0.7	0.7	1.5	0.4	0.0	0.3	0.6	0.5

[+]Excluded from the table are 7,900 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.
[#]Includes self-employed.
*Less than 0.1 percent.

TABLE 2.5B Type of Employer of Full-Time and Part-Time Employed Ph.D.s in the Humanities by Field of Doctorate, 1981 (1975-1980 Graduates)

		Field of Doctorate								
1981 Type of Employer	All Fields	Hist	Art Hist	Music	Speech/ Theater	Phil	Other Humn	Eng/ Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
Employed Population[+] (N)	19,300	4,600	700	2,000	700	1,400	600	5,100	300	3,900
Educational Institution	79.3	69.9	78.2	75.5	87.6	79.4	70.9	85.1	87.9	84.2
4-Year Coll/Univ/Med Sch.	67.7	56.9	74.9	66.1	82.1	74.8	64.8	68.7	74.8	73.3
2-Year College	7.0	8.0	2.1	5.4	5.2	3.9	4.2	11.5	0.9	4.0
Elem/Secondary School	4.6	4.9	1.1	4.1	0.3	0.7	1.9	4.9	12.1	6.9
Business/Industry[#]	10.5	10.8	6.9	11.2	6.7	10.3	22.2	10.1	9.1	9.9
U.S. Government	2.8	7.3	3.1	1.4	0.0	2.9	2.4	0.6	0.9	1.9
State/Local Government	2.5	4.2	2.4	0.9	1.0	1.4	2.9	2.4	0.0	2.2
Hospital/Clinic	0.1	0.0	0.0	0.0	1.3	0.2	0.0	0.0	0.0	0.4
Other Non-Profit Organization	4.2	7.0	8.4	9.9	1.5	5.7	1.6	1.7	2.1	1.0
Other	0.3	0.6	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
No Report	0.3	0.3	0.0	1.0	1.9	0.0	0.0	0.1	0.0	0.0

[+]Excluded from the table are 1,700 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.
[#]Includes self-employed.

PRIMARY WORK ACTIVITY BY FIELD OF DOCTORATE

Almost 70 percent of the humanities Ph.D.s who were employed full-time or part-time in February 1981 reported teaching as their primary work activity (Table 2.6A). The second most frequent work activity for humanists was management and administration (11 percent).[30]

Although teaching remained the primary work activity for the majority of humanists across all fields, there were variations among fields on the second most frequent primary work activity. For example, equal percentages of art history Ph.D.s were engaged in management/administration and curatorial work (7.3 and 7.4 percent, respectively). The second most frequent work activities for music Ph.D.s were management/administration and the performing arts (10.5 and 10.0 percent, respectively). Research and development was the primary work activity of over 8 percent of the Ph.D.s in classical languages and literature.

In general, the employment activities of recent Ph.D.s (Table 2.6B) did not differ greatly from those reported by the total 1938-1980 Ph.D. population (Table 2.6A). Teaching was still the primary work activity of a majority of Ph.D.s in all fields. In fact, over 70 percent of the recent Ph.D.s in modern languages and literature, speech/theater, English/American literature, and philosophy were engaged primarily in teaching. Recent Ph.D.s in

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[30]Teaching and management/administration were also the primary work activities of humanities Ph.D.s in previous survey years. In 1979, 65.1 percent of the humanities Ph.D.s reported teaching as their primary work activity, and 13.2 percent reported management/administration as their primary work activity. The comparable figures for 1977 were 69.3 percent teaching and 11.3 percent management and administration.

TABLE 2.6A Primary Work Activity of Full-Time and Part-Time Employed Ph.D.s in the Humanities by Field of Doctorate, 1981 (1938-1980 Graduates)

		Field of Doctorate								
1981 Primary Work Activity	All Fields	Hist	Art Hist	Music	Speech/ Theater	Phil	Other Humn	Eng/ Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
Employed Population+ (N)	68,100	18,400	1,700	4,700	2,900	5,600	1,800	19,000	1,600	12,400
Teaching	69.7	64.5	70.8	69.3	71.2	72.6	53.2	71.6	66.8	75.7
Research and Development	3.8	6.2	3.5	1.3	0.7	4.7	7.7	2.0	8.2	3.4
Consulting/Professional Services	2.8	2.9	2.2	1.2	2.8	4.2	7.2	2.9	3.2	2.0
Management/Administration	11.0	11.8	7.3	10.5	11.8	10.8	18.0	13.1	5.3	7.0
Writing/Editing	4.2	6.0	2.5	1.0	1.3	2.6	2.7	5.0	3.6	3.5
Cultural Resources	0.4	1.0	0.3	0.4	0.2	0.1	0.4	0.4	0.1	0.0
Archival Work	0.5	1.0	0.0	0.3	0.0	0.1	1.9	0.3	1.4	0.3
Curatorial Work	0.4	0.4	7.4	0.0	0.1	0.1	0.1	0.0	0.1	0.4
Performing Arts	1.0	0.1	0.0	10.9	4.7	0.0	0.0	0.0	0.0	0.3
Other	3.8	3.7	3.1	3.6	3.5	3.0	6.4	3.1	8.9	4.7
No Report	2.3	2.5	3.0	2.3	3.6	1.8	2.3	1.6	2.4	2.7

+Excluded from the table are 7,900 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.

TABLE 2.6B Primary Work Activity of Full-Time and Part-Time Employed Ph.D.s in the Humanities by Field of Doctorate, 1981 (1975-1980 Graduates)

		Field of Doctorate								
1981 Primary Work Activity	All Fields	Hist	Art Hist	Music	Speech/ Theater	Phil	Other Humn	Eng/ Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
Employed Population+ (N)	19,300	4,600	700	2,000	700	1,400	600	5,100	300	3,900
Teaching	67.2	53.5	67.6	66.5	74.1	70.4	44.5	73.9	67.6	76.2
Research and Development	3.5	5.3	3.3	1.3	0.3	6.4	14.1	1.2	7.6	3.0
Consulting/Professional Services	3.6	6.2	2.1	0.6	3.6	4.0	10.9	2.9	0.9	2.2
Management/Administration	9.1	9.8	5.1	9.2	6.7	9.6	14.3	11.7	6.7	5.3
Writing/Editing	4.9	9.8	1.6	1.1	0.4	2.6	2.2	4.9	1.5	4.2
Cultural Resources	0.7	2.4	0.0	0.0	0.9	0.4	0.8	0.1	0.0	0.0
Archival Work	1.1	3.0	0.0	0.0	0.0	0.0	1.0	1.0	4.5	0.3
Curatorial Work	0.8	1.3	12.9	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Performing Arts	2.0	0.3	0.0	14.6	6.4	0.0	0.0	0.0	0.0	0.7
Other	5.7	6.6	4.0	5.0	3.5	6.6	10.8	4.1	10.0	6.4
No Report	1.3	1.8	3.5	1.6	4.1	0.0	1.4	0.2	1.2	1.6

+Excluded from this table are 1,700 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.

"other humanities" had a relatively high percentage of primary involvement in research and development (14.1 percent) and management and administration (14.3 percent). In both the total Ph.D. population and the recent Ph.D. cohort, relatively high percentages of art historians were primarily engaged in curatorial work (7.4 and 12.9 percent, respectively), and music Ph.D.s were engaged primarily in the performing arts (10.0 and 14.6 percent, respectively).

MEDIAN ANNUAL SALARY BY SEX, YEARS SINCE DOCTORATE, AND FIELD OF DOCTORATE

The median annual salary in 1981 for full-time employed Ph.D.s in the humanities was $26,300 (Table 2.7). By field, speech/theater Ph.D.s had a high median salary, $28,300, and Ph.D.s in classical languages and literature had a low median annual salary of $24,900.

For all fields combined, men had a median salary of $27,400 compared with $23,200 for women, a differential of over $4,000. Men also reported higher salaries in each of the humanities fields (Figure 2.1). The greatest salary difference between men and women was in the field of "other humanities," where salaries for men exceeded those for women by $5,500. The most equitable field in terms of salaries for men and women was classical languages and literature, where the salary differential was only $2,800.

In general, the median annual salaries of men and women became more disparate with the increase in the number of years since the Ph.D. was awarded. For example, the salary differential between men and women within five years of receipt of the degree was only $1,300 ($20,900 for men and $19,500 for women). However, in the "over 30 years since degree" category, men earned median annual salaries of $41,000 and women earned $31,000 (Table 2.7).

The data show a general increase in salary that corresponds with an increase in the number of years since the Ph.D. was granted. However, because of the small numbers of Ph.D.s in the older cohorts, median salaries could not always be reported by field.

TABLE 2.7 Median Annual Salaries* of Full-Time Employed Ph.D.s in the Humanities by Sex, Years Since Ph.D., and Field of Ph.D., 1981 (in thousands of dollars)

		Field of Doctorate								
Sex and Years Since Ph.D.	All Fields	Hist	Art Hist	Music	Speech/ Theater	Phil	Other Humn	Eng/ Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
TOTAL	$26.3	$27.0	$25.2	$26.0	$28.3	$26.0	$27.1	$26.2	$24.9	$25.4
5 or less	20.4	20.2	19.8	21.6	21.2	20.2	21.0	20.9	18.1	19.1
6-10	24.4	24.7	25.2	25.4	26.2	24.2	26.9	24.0	23.0	24.2
11-15	28.9	28.5		30.7	29.2	29.5		29.7		28.0
16-20	32.7	34.4	34.6	32.0		34.3	38.3	30.9		32.2
21-25	35.1	36.5				33.2		35.2		34.6
26-30	39.2	40.1								
Over 30	40.2									
Male, TOTAL	27.4	27.8	27.5	26.6	28.8	26.7	29.4	27.7	25.3	26.7
5 or less	20.9	20.1	19.0	21.8	21.6	20.0	21.3	21.6	18.4	19.9
6-10	24.8	24.9	26.6	26.2	27.0	24.3	29.6	24.5	24.1	24.5
11-15	29.2	28.6		30.9	29.3	29.9		30.2		28.0
16-20	33.3	34.5				34.4	38.5			33.0
21-25	35.7									
26-30	39.6	40.5								
Over 30	41.1									
Female, TOTAL	23.2	24.2	22.8	21.9	24.9	22.7	23.9	23.1	22.5	22.9
5 or less	19.5	20.5	20.1	20.0	19.1	20.4	20.7	19.9	17.4	17.9
6-10	22.9	23.3	23.3	22.0	24.5	22.6		22.6	22.0	23.2
11-15	28.0	28.2	30.2	26.7				27.9		28.0
16-20	30.5									31.0
21-25	29.7									
26-30										
Over 30	31.0									

*Median salaries were computed only for Ph.D.s employed full-time, excluding those in the U.S. Military. Academic salaries were multiplied by 11/9 to adjust for a full-year scale. Medians were not reported for cells with less than 20 cases reporting salary or a sampling error of ± $2,000.

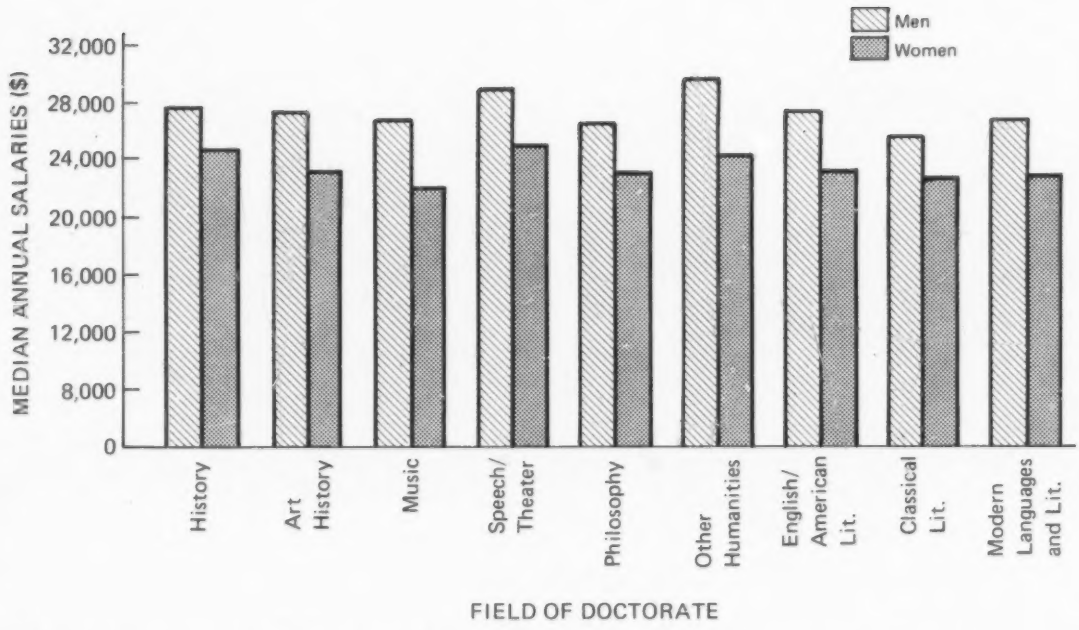


FIGURE 2.1 Median Annual Salaries of Full-Time Employed Ph.D.s in the Humanities by Field of Doctorate and Sex, 1981

TABLE 2.8 Median Annual Salaries* of Full-Time Employed Ph.D.s in the Humanities by Sex, Type of Employer, and Field of Doctorate, 1981 (in thousands of dollars)

		Field of Doctorate								
Sex and Type of Employer	All Fields	Hist	Art Hist	Music	Speech/ Theater	Phil	Other Humn	Eng/ Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
TOTAL	$26.3	$27.0	$25.2	$26.0	$28.3	$26.0	$27.1	$26.2	$24.9	$25.4
Educational Institution	26.5	27.5	25.4	26.4	28.4	26.5	27.9	26.4	25.4	25.6
4-Year Coll/Univ/Med Sch.	**26.5**	**27.3**	**25.3**	**26.4**	**28.3**	**26.6**	**27.9**	**26.5**	**25.3**	**25.5**
2-Year College	**26.6**	**29.6**						**24.1**		
Elem/Secondary School	**25.6**									**24.4**
Business/Industry+	21.8	18.5				18.5				
Government	25.4	25.5								
Other/No Report	22.3							19.0		
Male, TOTAL	27.4	27.8	27.5	26.6	28.8	26.7	29.4	27.7	25.3	26.7
Educational Institution	27.8	28.2	27.6	27.0	28.8	27.4	29.9	27.9	25.6	26.9
4-Year Coll/Univ/Med Sch.	**27.8**	**28.0**	**27.5**	**26.9**	**28.7**	**27.4**	**29.8**	**28.1**	**25.6**	**26.9**
2-Year College	**28.0**									
Elem/Secondary School	**26.7**									
Business/Industry+										24.6
Government	27.1									
Other/No Report										
Female, TOTAL	23.2	24.2	22.8	21.9	24.9	22.7	23.9	23.1	22.5	22.9
Educational Institution	23.7	24.4	23.1	22.6	26.1	23.3	23.5	23.7	23.4	23.3
4-Year Coll/Univ/Med Sch.	**23.5**	**24.3**	**23.0**	**22.4**	**25.8**	**23.4**	**23.6**	**23.7**	**23.4**	**23.1**
2-Year College	**25.6**							**23.9**		
Elem/Secondary School	**20.2**									
Business/Industry+	21.0									17.7
Government	20.5									
Other/No Report	18.0									15.3

*Median salaries were computed only for Ph.D.s employed full-time, excluding those in the U.S. Military. Academic salaries were multiplied by 11/9 to adjust for a full-year scale. Medians were not reported for cells with less than 20 cases reporting salary or a sampling error of ± $2,000.

+Includes self-employed.

MEDIAN ANNUAL SALARY BY SEX, TYPE OF EMPLOYER AND FIELD OF DOCTORATE

The median annual salary for the humanities Ph.D.s who were employed full-time by educational institutions was $26,500 (Table 2.8). Humanists employed by the government earned a median salary of $25,400, and those working in business and industry (including self-employment) earned $21,800. Interestingly, this salary ranking is almost the complete opposite of that of science/engineering Ph.D.s, where the highest median salaries are earned by those Ph.D.s employed in business/industry and government, followed by the salaries of those employed in educational institutions.

Salary comparisons by field of Ph.D. show that the median annual salary of Ph.D.s in speech/theater employed by educational institutions was among the highest by field and type of employer ($28,400).

Men earned higher median salaries than women in all employer categories. For Ph.D.s employed by educational institutions, men in four-year colleges/universities earned a median salary of $27,300 compared to $23,500 for women similarly employed.

GEOGRAPHIC DIFFERENCES IN EMPLOYMENT STATUS

The labor force of doctorate recipients in the humanities in 1981 was approximately 69,700. Of these, 91.2 percent were working full-time and 1.5 percent were unemployed and seeking employment (Table 2.9). The remaining 7.3 percent of the labor force held part-time jobs or postdoctoral appointments. Of the 6.5 percent who were part-time employed, 2.2 percent were seeking full-time employment.

Regional Variations

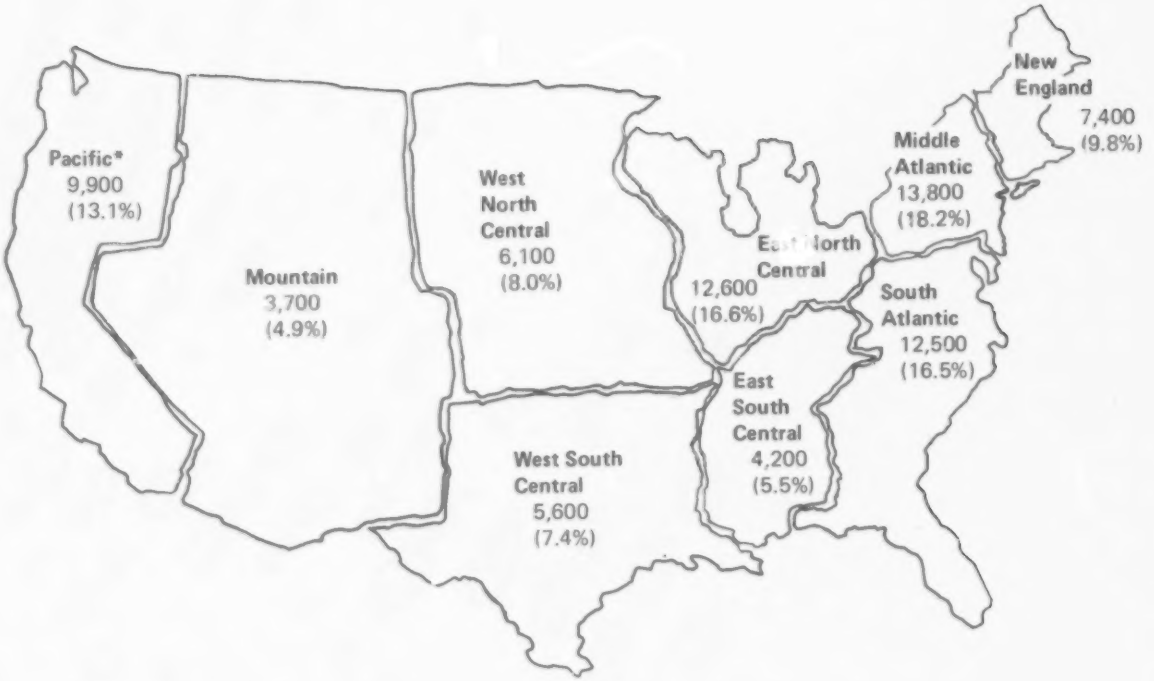
Regionally, there were similarities in the percentages of humanities Ph.D.s who were employed on a full-time basis. The region

TABLE 2.9 Employment and Unemployment of Humanities Ph.D.s in the U.S. Labor Force by Region,[+] 1981

1981 Labor Force Status	All Regions	1981 Location (Region)									
		New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific	U.S. Possessions
Total Ph.D. Labor Force*	69,700	6,800	12,900	11,600	5,500	11,500	3,800	5,300	3,400	8,700	200
Employed Full-Time	91.2	88.6	89.6	92.4	93.8	93.0	95.5	92.3	91.9	87.0	95.8
Employed Part-Time	6.5	7.4	8.2	6.2	4.6	3.9	4.4	6.1	6.8	9.8	0.0
Seeking Full-Time Employment	**2.2**	**1.4**	**3.8**	**1.9**	**0.7**	**1.1**	**1.6**	**1.7**	**2.2**	**4.0**	**0.0**
Not Seeking F-T Empl./No Rept.	**4.3**	**5.9**	**4.8**	**4.2**	**3.9**	**2.8**	**2.8**	**4.4**	**4.6**	**5.8**	**0.0**
Postdoctoral Appointment	0.8	2.2	0.5	0.2	0.3	1.0	0.0	0.9	0.3	1.1	1.2
Unemployed and Seeking Employ	1.5	1.9	1.7	1.2	1.3	2.1	0.1	0.7	1.0	2.1	3.0

[+]Regions by state are as follows: New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont); Middle Atlantic (New Jersey, New York, Pennsylvania); East North Central (Illinois, Indiana, Michigan, Ohio, Wisconsin); West North Central (Iowa, Kansas, Minnesota, Missouri, North Dakota, Nebraska, South Dakota); South Atlantic (Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia); East South Central (Kentucky, Alabama, Mississippi, Tennessee); West South Central (Arkansas, Louisiana, Oklahoma, Texas); Mountain (Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming); Pacific (Alaska, California, Hawaii, Oregon, Washington).

*Includes full-time and part-time employed, postdoctoral appointees, and those unemployed and seeking employment.



*Includes Alaska and Hawaii

FIGURE 2.2 Regional Distribution of the U.S. Population of Humanities Doctorates and Percentage Distribution of the Total Ph.D. Population, 1981 (estimated population of 1938-1980 Humanities Ph.D.s in the U.S. = 75,800 excluding 200 in U.S. possessions)

with the highest percentage of Ph.D.s working full-time was the East South Central region (Alabama, Kentucky, Mississippi, and Tennessee), 95.5 percent.

The highest percentage of part-time employed Ph.D.s was found in the Pacific region (Alaska, California, Hawaii, Oregon, and Washington), 9.8 percent, and the highest percentage of Ph.D.s on postdoctoral appointments, 2.2 percent, was in the New England region (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont). These findings are similar to those for the science and engineering Ph.D.s.

The Pacific and South Atlantic regions had relatively high unemployment rates, 2.1 percent each, but only 0.1 percent of the Ph.D.s in the East South Central states were unemployed and seeking employment.

Figure 2.2 gives the distribution of humanities Ph.D.s in the United States by region. The region with the largest number of humanities Ph.D.s (13,800) was the Middle Atlantic (New Jersey, New York, and Pennsylvania). The region with the smallest number of humanists (3,700) was the Mountain states (Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, and Wyoming).

EMPLOYMENT STATUS BY SEX AND FIELD OF DOCTORATE

The fields of philosophy and speech/theater had relatively low rates of unemployment when compared with other fields: 0.6 and 0.8 percent, respectively (Table 2.10). Art history and "other humanities" had the highest percentages of Ph.D.s who were unemployed and/or seeking employment -- 4.2 and 3.4 percent, respectively. Part-time employment ran high for Ph.D.s in music (9.3 percent) and art history (8.3 percent), of which only 3.1 and 2.7 percent, respectively, were seeking full-time employment.

A comparison of employment status by sex shows that higher percentages of men than women were employed full-time, and

TABLE 2.10 Employment and Unemployment of Humanities Ph.D.s in the U.S. Labor Force by Sex and Field of Doctorate, 1981

		Field of Doctorate								
1981 Labor Force Status/Sex	All Fields	Hist	Art Hist	Music	Speech/ Theater	Phil	Other Humn	Eng/ Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
TOTAL Ph.D. Labor Force*	69,700	18,700	1,900	4,800	3,000	5,700	1,900	19,300	1,600	12,800
Employed Full-Time	91.2	92.0	85.2	88.2	92.5	92.0	91.2	92.2	89.8	89.9
Employed Part-Time	6.5	6.0	8.3	9.3	5.5	6.5	4.6	6.1	7.4	7.1
Seeking Full-Time Employment	**2.2**	**2.2**	**2.7**	**3.1**	**1.6**	**2.6**	**2.1**	**1.5**	**2.6**	**2.8**
Not Seeking F-T Empl./No Rept.	**4.3**	**3.7**	**5.6**	**6.2**	**3.9**	**3.8**	**2.5**	**4.6**	**4.8**	**4.3**
Postdoctoral Appointment	0.8	0.8	2.4	0.3	1.2	0.9	0.7	0.5	0.9	0.9
Unemployed and Seeking Employ	1.5	1.2	4.2	2.2	0.8	0.6	3.4	1.2	1.9	2.1
Ph.D. Labor Force,* Male	51,200	15,900	1,000	3,900	2,400	4,900	1,300	13,000	1,100	7,700
Employed Full-Time	94.3	94.1	95.1	90.9	95.3	93.5	91.8	95.7	94.7	94.3
Employed Part-Time	4.0	4.5	2.7	7.2	3.0	5.6	3.0	2.9	2.9	3.2
Seeking Full-Time Employment	**1.4**	**1.5**	**1.0**	**2.6**	**0.8**	**2.3**	**2.2**	**0.5**	**1.6**	**1.3**
Not Seeking F-T Empl./No Rept.	**2.6**	**2.9**	**1.7**	**4.6**	**2.2**	**3.3**	**0.8**	**2.4**	**1.3**	**1.9**
Postdoctoral Appointment	0.6	0.5	1.6	0.2	1.3	0.6	1.1	0.2	0.6	1.0
Unemployed and Seeking Employ	1.1	0.9	0.6	1.8	0.4	0.3	4.1	1.2	1.8	1.5
Ph.D. Labor Force,* Female	18,500	2,800	900	900	600	800	600	6,300	500	5,100
Employed Full-Time	82.7	80.5	73.4	76.9	81.3	83.4	90.1	85.0	77.2	83.2
Employed Part-Time	13.5	14.4	14.9	18.4	15.6	11.6	7.8	12.7	18.8	13.1
Seeking Full-Time Employment	**4.6**	**6.2**	**4.7**	**5.0**	**5.0**	**4.8**	**2.1**	**3.6**	**5.1**	**5.2**
Not Seeking F-T Empl./No Rept.	**8.8**	**8.2**	**10.2**	**13.4**	**10.6**	**6.9**	**5.7**	**9.1**	**13.7**	**7.9**
Postdoctoral Appointment	1.3	2.3	3.3	0.9	0.5	2.2	0.0	1.0	1.8	0.8
Unemployed and Seeking Employ	2.6	2.7	8.4	3.8	2.6	2.8	2.1	1.4	2.2	2.9

*Includes full-time and part-time employed, postdoctoral appointees, and those unemployed and seeking employment.

considerably higher percentages of women than men were employed on a part-time basis. The unemployment rate for women was over twice the rate for men (2.6 percent for women compared with 1.1 percent for men).[31] The highest unemployment rate occurred for female Ph.D.s in art history (8.4 percent).

ACADEMIC POSITION BY COHORT, FIELD OF DOCTORATE, AND SEX

Table 2.11 shows the percentage distribution of doctorates in the humanities who were employed in United States colleges and universities in 1981 by field of Ph.D., year of Ph.D., sex and academic position.

Among academically employed humanists who had earned their doctoral degrees between 1938 and 1959, 94.8 percent of the men and 84.2 percent of the women held faculty positions. In this cohort, men held the rank of full professor more frequently than women (87.2 percent for men and 67.2 percent for women). Women were more likely than men to be associate professors (7.5 percent for men and 13.6 percent for women).

Although a slightly higher percentage of men in the 1960-1969 cohort held faculty positions than women, within the field groupings of "other languages" and "other humanities," the percentages were nearly equal for men and women. In general, higher percentages of men were full professors and higher percentages of women were assistant professors. The greatest discrepancy between the sexes occurred in the field of history, where 66.2 percent of the men had full professor rank compared with only 43.7 percent of the women.

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[31] The reader should note that the unemployment rate for women has dropped from 4.6 percent in 1979 to 2.6 percent in 1981. However, for men the unemployment rate was 1.4 percent in 1979 and 1.1 percent in 1981.

TABLE 2.11 Academic Position of Humanities Ph.D.s by Year of Doctorate, Field of Doctorate, and Sex, 1981

1981 Academic Position/ Year of Ph.D.	Field of Doctorate/Sex									
	All Fields		Eng/Amer Lit		History		Other Lang.		Other Humn.	
	M	F	M	F	M	F	M	F	M	F
Total, 1938-1959 Ph.D.s	7,300	1,000	2,100	300	2,400	200	1,200	300	1,600	200
Faculty	94.8	84.2	96.5	77.1	93.2	81.2	93.3	90.6	96.1	89.3
Professor	87.2	67.2	89.7	36.6	86.4	62.8	84.2	74.2	87.4	79.2
Associate Professor	7.5	13.6	6.9	17.3	6.8	18.3	9.1	10.9	8.3	6.2
Assistant Professor	0.1	2.7	0.0	3.3	0.0	0.0	0.0	3.6	0.5	3.4
Instructor	0.0	0.7	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.6
Nonfaculty	0.4	2.1	0.0	3.0	0.0	0.0	2.2	3.0	0.0	1.1
Teaching Staff*	0.4	1.5	0.0	3.0	0.0	0.0	2.2	1.8	0.0	0.0
Research Staff†	0.0	0.6	0.0	0.0	0.0	0.0	0.0	1.2	0.0	1.1
Postdoctoral Appointment	0.5	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.6	0.0
Other/No Report	4.3	13.7	3.5	19.9	6.8	18.8	2.2	6.4	3.3	9.6
Total, 1960-1969 Ph.D.s	13,800	3,200	3,800	1,200	4,100	500	2,400	900	3,500	600
Faculty	93.5	87.7	91.0	81.1	96.3	90.7	95.4	93.0	91.6	91.0
Professor	60.5	46.2	51.2	44.1	66.2	43.7	54.4	43.2	68.1	57.1
Associate Professor	29.2	30.6	34.1	24.2	26.3	35.9	39.3	38.0	20.3	28.3
Assistant Professor	3.7	9.2	5.7	11.2	3.8	9.3	1.4	10.4	3.0	3.3
Instructor	0.1	1.7	0.0	1.5	0.0	1.7	0.4	1.4	0.2	2.3
Nonfaculty	0.5	1.7	0.0	3.2	0.0	0.0	0.6	1.2	1.6	0.5
Teaching Staff*	0.4	1.0	0.0	1.4	0.0	0.0	0.0	1.2	1.6	0.5
Research Staff†	0.1	0.7	0.0	1.8	0.0	0.0	0.6	0.0	0.0	0.0
Postdoctoral Appointment	0.4	1.0	0.0	1.5	0.0	1.7	1.1	0.2	0.8	0.5
Other/No Report	5.6	9.7	9.0	14.3	3.7	7.6	2.9	5.5	6.1	8.0
Total, 1970-1974 Ph.D.s	12,200	4,600	3,100	1,700	3,600	700	2,300	1,400	3,200	800
Faculty	91.6	85.3	93.1	84.5	85.8	83.5	96.0	87.3	93.7	85.3
Professor	22.4	14.4	22.7	15.1	27.0	14.8	11.1	11.9	25.0	16.8
Associate Professor	51.9	44.1	50.7	38.8	45.3	45.3	63.7	50.4	52.2	44.0
Assistant Professor	16.1	23.0	18.8	27.5	11.6	18.9	19.6	20.1	15.9	21.7
Instructor	1.2	3.8	1.0	3.1	1.8	4.4	1.6	4.9	0.6	2.8
Nonfaculty	1.6	2.2	0.7	1.5	2.5	4.6	1.2	2.4	1.9	1.6
Teaching Staff*	1.3	1.8	0.7	1.5	2.5	3.0	1.1	1.8	0.5	1.3
Research Staff†	0.4	0.5	0.0	0.0	0.0	1.6	0.1	0.7	1.4	0.2
Postdoctoral Appointment	0.8	1.2	0.1	1.3	2.2	1.6	0.6	0.8	0.2	1.0
Other/No Report	5.9	11.3	6.1	12.6	9.5	10.3	2.2	9.4	4.2	12.2
Total, 1975-1980 Ph.D.s	8,900	5,700	2,200	1,900	2,200	800	1,500	1,700	3,000	1,300
Faculty	88.1	82.3	89.7	86.1	84.4	73.8	91.8	83.4	87.8	80.3
Professor	3.2	3.5	3.5	3.5	9.6	7.7	4.8	1.3	3.2	3.8
Associate Professor	26.7	12.2	28.9	17.2	21.7	8.1	17.5	7.0	33.9	14.5
Assistant Professor	49.8	59.6	50.4	58.3	45.5	46.7	61.8	69.2	46.2	56.0
Instructor	6.5	7.1	7.0	7.3	7.6	11.4	7.7	5.8	4.6	6.0
Nonfaculty	2.2	3.4	1.6	3.9	4.9	1.8	0.1	3.9	1.7	2.9
Teaching Staff*	0.6	2.0	0.0	2.6	1.2	0.0	0.1	2.4	0.9	1.6
Research Staff†	1.6	1.4	1.6	1.4	3.6	1.8	0.0	1.5	0.7	1.3
Postdoctoral Appointment	0.8	1.6	0.2	0.3	0.5	4.0	0.8	1.0	1.6	3.0
Other/No Report	8.9	12.6	8.5	9.6	10.2	20.4	7.3	11.6	8.9	13.8

*Includes nonfaculty staff members whose primary work activity is teaching.
†Includes nonfaculty staff members whose primary work activity is basic research, applied research, development, or design.

In general, higher percentages of the 1970-1974 Ph.D. men held associate professor rank and higher percentages of the women in this cohort held assistant professor rank. Men who earned their doctorates in history between 1970-1974 had a much higher percentage with full professor rank than did women in this field and cohort: 27 percent for men compared with 14.8 percent for women.

Only small percentages of the recent (1975-1980) humanists who were academically employed held nonfaculty positions or postdoctoral appointments. As would be expected, very few of these recent Ph.D.s had earned full professorships. A greater percentage of the men than women, however, had obtained the rank of associate professor as of February 1981 (26.7 percent for men and 12.2 for women).

TENURE STATUS BY FIELD, SEX, AND AGE

In general, male humanities Ph.D.s were much more likely to hold tenured positions than were women (Table 2.12). Over three-fourths (76.0 percent) of the men were tenured compared with only half of the women (49.8 percent). More than twice as many women held non-tenure track positions (21.8 percent) than did the men (8.5 percent).

The smallest differences between men and women in tenure rates occurred in the 35 or under age category, where 16.6 percent of the men were tenured compared to 13.4 percent of the women. The women in this category, however, were more likely to be in non-tenure track positions than were the men (32 percent for women and 21 percent for men). By field grouping the difference is even more pronounced. For example, in the history field as many as 44 percent of the women age 35 or under were in non-tenure track positions, compared with 30 percent of the men.

TABLE 2.12 Tenure Status of Academically Employed Ph.D.s in the Humanities by Field of Doctorate, Age, and Sex, 1981

	Field of Doctorate/Sex									
	All Fields		Eng/Amer Lit		History		Other Lang		Other Humn	
Age and Tenure Status	M	F	M	F	M	F	M	F	M	F
Total Academically Employed (N)	42,200	14,500	11,200	5,100	12,300	2,200	7,400	4,300	11,300	2,900
Tenured	76.0	49.8	78.2	51.4	77.5	47.4	77.2	49.2	71.5	49.9
Not Tenured	20.3	43.4	19.0	40.6	18.3	44.4	19.7	45.8	24.1	44.4
Tenure Track	**11.8**	**21.6**	**11.2**	**19.8**	**8.8**	**17.6**	**14.2**	**24.4**	**14.0**	**23.8**
Non-Tenure Track	**8.5**	**21.8**	**7.8**	**20.8**	**9.6**	**26.8**	**5.5**	**21.4**	**10.1**	**20.6**
No Report	3.7	6.7	2.8	8.0	4.2	8.2	3.1	5.1	4.4	5.8
Age - 35 or Under (N)	4,100	2,500	1,100	700	1,000	400	700	900	1,300	500
Tenured	16.6	13.4	21.9	16.2	13.2	9.7	10.7	11.3	18.2	15.5
Not Tenured	73.0	82.7	68.8	79.0	75.9	86.5	82.9	86.2	68.7	79.4
Tenure Track	**51.7**	**50.8**	**51.4**	**48.7**	**45.9**	**42.7**	**62.1**	**55.2**	**50.2**	**51.4**
Non-Tenure Track	**21.4**	**32.0**	**17.4**	**30.3**	**30.0**	**43.8**	**20.8**	**31.0**	**18.5**	**28.0**
No Report	10.4	3.9	9.3	4.8	10.9	3.7	6.4	2.5	13.1	5.1
Age - 36 to 45 (N)	17,700	5,900	5,000	2,100	5,100	900	3,200	1,800	4,400	1,100
Tenured	73.5	45.7	77.3	48.1	72.0	46.4	76.8	44.4	68.5	42.7
Not Tenured	22.6	46.9	19.5	45.0	22.6	44.5	19.5	46.5	28.3	53.3
Tenure Track	**12.5**	**22.5**	**11.3**	**18.5**	**10.1**	**16.3**	**14.2**	**25.6**	**15.4**	**29.9**
Non-Tenure Track	**10.1**	**24.5**	**8.2**	**26.6**	**12.6**	**28.2**	**5.3**	**20.9**	**12.9**	**23.4**
No Report	3.9	7.3	3.2	6.9	5.4	9.1	3.7	9.1	3.2	4.0
Age - 46 or Older (N)	20,400	6,100	5,100	2,300	6,200	900	3,500	1,600	5,600	1,300
Tenured	90.2	68.7	91.0	65.7	92.2	62.4	91.7	75.3	86.4	70.2
Non Tenured	7.7	24.0	8.0	24.3	5.7	28.4	6.4	22.5	10.4	22.2
Tenure Track	**3.1**	**8.8**	**2.7**	**11.7**	**1.8**	**9.3**	**4.0**	**5.8**	**4.4**	**7.1**
Non-Tenure Track	**4.5**	**15.2**	**5.3**	**12.6**	**3.9**	**19.1**	**2.4**	**16.7**	**6.0**	**15.1**
No Report	2.1	7.3	1.0	10.0	2.1	9.2	1.9	2.2	3.2	7.6

APPENDIX A

1981 SURVEY OF DOCTORATE RECIPIENTS

QUESTIONNAIRE AND SPECIALTIES LIST

AND

1981 ABBREVIATED QUESTIONNAIRE

1981 SURVEY OF DOCTORATE RECIPIENTS

OMB No. 3145-0020

CONDUCTED BY THE NATIONAL RESEARCH COUNCIL WITH THE SUPPORT OF THE NATIONAL SCIENCE FOUNDATION, THE NATIONAL ENDOWMENT FOR THE HUMANITIES, THE NATIONAL INSTITUTES OF HEALTH, AND THE DEPARTMENT OF ENERGY

NOTE: THIS INFORMATION IS SOLICITED UNDER THE AUTHORITY OF THE NATIONAL SCIENCE FOUNDATION ACT OF 1950, AS AMENDED. ALL INFORMATION YOU PROVIDE WILL BE TREATED AS CONFIDENTIAL, WILL BE SAFEGUARDED IN ACCORDANCE WITH THE PROVISIONS OF THE PRIVACY ACT OF 1974, AND WILL BE USED FOR STATISTICAL PURPOSES ONLY. INFORMATION WILL BE RELEASED ONLY IN THE FORM OF STATISTICAL SUMMARIES OR IN A FORM WHICH DOES NOT IDENTIFY INFORMATION ABOUT ANY PARTICULAR PERSON. YOUR RESPONSE IS ENTIRELY VOLUNTARY AND YOUR FAILURE TO PROVIDE SOME OR ALL OF THE REQUESTED INFORMATION WILL IN NO WAY ADVERSELY AFFECT YOU.

If your name and address are incorrect, please enter correct information below.

_____

_____

_____

— — — — — – — — — —

INCLUDE NEW NINE-DIGIT ZIP CODE IF KNOWN (10)

If there is an alternate address through which you can always be reached, please provide it on the line below.

_____

c/o Number Street City State ZIP Code (11)

1a. How many full-time equivalent years of professional work experience have you had? _____ **Year(s)** (12-13)

b. Since receiving the doctorate, how many full-time equivalent years of professional work experience have you had? _____ **Year(s)** (14-15)

c. Since receiving the doctorate, how many full-time equivalent years of work experience, if any, involved teaching? _____ **Year(s)** (16-17)

2. What was your employment status (includes postdoctoral appointment*) during FEBRUARY 1981? ☐ Circle your selection and enter number from below (18)

1. Employed full-time (Skip to Question #4)
2. Employed part-time
   If you were employed part-time, were you seeking full-time employment? ☐ Yes ☐ No (19)
3. Postdoctoral appointment*
   If you held a postdoctoral appointment, was it ☐ full-time (Skip to Question #4) ☐ part-time (20)
4. Unemployed and seeking employment
5. Not employed and not seeking employment — (Skip to Question #20)
6. Retired and not employed
7. Other, specify _____

*Temporary appointment in academia, industry or government, the primary purpose of which is to provide for continued education or experience in research.

3. If you were employed part-time during FEBRUARY 1981, what was the MOST important reason for being in that position? ☐ Enter number from below (21)

1. Part-time employment preferred
2. Full-time position not available
3. Constraints due to family or marital status
4. Other, specify _____

4. From the Degree and Employment Specialties List on page 4 select and enter both the number and title of the employment specialty most closely related to your principal employment or postdoctoral appointment during FEBRUARY 1981. Write in your specialty if it is not on the list.

_____

Number Title of Employment Specialty (22-24)

5. If you were employed during FEBRUARY 1981 in a specialty field other than your field of Ph.D., what was the MOST important reason for being in that position? ☐ Enter number from below (25)

1. Better pay
2. More attractive career options
3. Preferred specific geographic location
4. Constraints due to family or marital status
5. Position in Ph.D. field not available
6. Promoted out of position in Ph.D. field
7. Other, specify _____

6. Please give the name of your principal employer (company, organization, postdoctoral institution, etc. or, if self employed, write "self") and actual place of employment during FEBRUARY 1981.

_____

Name of Employer (26-31)

_____

Number Street

_____

City State

_____

ZIP Code (32-40)

7. **Which category below best describes the type of organization of your principal employment OR postdoctoral appointment during FEBRUARY 1981?**

Enter number from below ☐ (41-42)

1. Business or industry (including self-employed)
2. Junior college, 2-year college, technical institute
3. Medical school (including university affiliated hospital or medical center)
4. 4-year college
5. University, other than medical school
6. Elementary or secondary school system
7. Private foundation
8. Hospital or clinic
9. U.S. military service, active duty, or Commissioned Corps, e.g., USPHS, NOAA
10. U.S. government, civilian employee
11. State government
12. Local or other government, specify: _____
13. Nonprofit organization, other than those listed above
14. Other, specify _____

8. **What were your primary and secondary work activities during FEBRUARY 1981? (Enter number from the list provided below)**

Primary ☐ (43-44) Secondary ☐ (45-46)

1. Teaching
2. Basic research
3. Applied research
4. Development of equipment, products, systems, data
5. Design
6. Writing
7. Editing
8. Professional services to individuals

Management or administration of:

9. Research and development
10. Educational programs
11. Other
12. Consulting
13. Production
14. Cultural resources
15. Archival work
16. Curatorial work
17. Performing arts
18. Quality control, inspection, testing
19. Sales, marketing, purchasing, estimating
20. Other, specify _____

9. **What was the basic annual salary* associated with your principal professional employment during FEBRUARY 1981? If you were on a postdoctoral appointment (see question #2 for definition), what was your stipend plus allowances?** $ _____ per year (47-49)

Check whether salary was for ☐ 9-10 months or ☐ 11-12 months (50)

*Basic salary is your annual salary before deductions for income tax, social security, retirement, etc., but does not include bonuses, overtime, summer teaching, or other payment for professional work.

10a. **What was your basic annual salary* for the year ending December 31, 1980?** $ _____ per year (51-53)
Check whether salary was for ☐ 9-10 months or ☐ 11-12 months (54)

b. **What was your gross professional income† for the year 1980?** $ _____ per year (55-57)

†Gross professional income is all payments received for professional activities including basic salary before deductions plus bonuses, consulting fees, honoraria, royalties, rental and subsistence allowances, etc.

11. **What percentage of your professional work time did you devote to each of the following activities during FEBRUARY 1981?**
(Total should equal 100%)

%		%	
_____	(58) Management or administration of R&D	_____	(70) Consulting
_____	(60) Management or administration of educational programs	_____	(72) Writing/editing
_____	(62) Management or administration of other programs	_____	(74) Development/design
_____	(64) Teaching	_____	(76) Cultural resources
_____	(66) Applied research	_____	(78) Other, specify _____
_____	(68) Basic research		

12. **If you were employed by an academic institution during FEBRUARY 1981, did you hold a tenured position?** 1 ☐ Yes 2 ☐ No (10)

If YES, what year was tenure granted? _____ (11-12)

If NO, did you hold a tenure-track position? 1 ☐ Yes 2 ☐ No (13)

13. **If you were employed by an academic institution during FEBRUARY 1981, what was the rank of your position?** Enter number from below ☐ (14)

Faculty

1. Professor
2. Associate professor
3. Assistant professor
4. Instructor
5. Administrator
6. Other, specify _____ *Title*

Non-Faculty

7. Teaching staff
8. Research staff
9. Other, specify _____ *Title*

14. **Was any of your work during FEBRUARY 1981 supported or sponsored by U.S. Government funds?**

1 ☐ Yes 2 ☐ No 3 ☐ Don't Know (15)

If YES, which federal agencies or departments were supporting the work?

Enter number(s) from the List of Federal Supporting Agencies on page 4. _____ (16-39)

15. **How important was your DOCTORAL degree in enabling you to attain your present position?** (Check only one.)

1 ☐ Essential qualification
2 ☐ Helpful, but not essential
3 ☐ Unimportant
4 ☐ Cannot ascertain (40)

16. **Listed below are selected topics of national interest. If you devoted a proportion of your professional time which you considered significant to any of these problem areas during FEBRUARY 1981, please give the corresponding number of the ONE on which you spent the MOST time.**

☐ Enter number from below (41-42)

1. Energy or fuel
2. Health
3. Defense
4. Environ. protection, pollution control
5. Education (other than teaching)
6. Space
7. Crime prevention and control
8. Food and other agricultural products
9. Natural resources, other than fuel or food
10. Community development and services
11. Housing (planning, design, construction)
12. Transportation, communications
13. Cultural life
14. Other area, specify _____

If you did not select energy or fuel (category #1) in question #16, please skip to question #20.

17. **From the list below, give the corresponding number of the ONE energy source that involved the LARGEST proportion of your energy-related work during FEBRUARY 1981.**

☐ Enter number from below (43)

1. Coal and coal products
2. Petroleum (including oil shale and tar sands) or natural gas
3. Fission
4. Fusion
5. Hydroenergy
6. Direct solar (including space and water heating, thermal, electric)
7. Indirect solar (winds, tides, biomass, etc.)
8. Geothermal
9. Other, specify _____

18. **Please read the following list of energy-related activities and give the corresponding number(s) from the list below of the activity(ies) in which you were engaged during FEBRUARY 1981.** Enter number(s) from below _____ (44-63)

1. Exploration
2. Extraction (gas, oil, mining)
3. Manufacture of energy-related components or products
4. Fuel processing (including refining and enriching)
5. Electric power generation
6. Transportation, transmission, distribution of fuel or energy
7. Energy storage
8. Energy utilization, management
9. Fuel reprocessing or disposal
10. Energy conservation
11. Environmental impact (health, economic, etc.)
12. Education, training
13. Research and development
14. Other, specify _____

19. **Please enter the number 1-14 from question #18 that BEST describes the activity in which you spent MOST of your energy-related time.** ☐ (64-65)

20. **What is the major field of your doctorate? Please use the Specialties List on page 4. Please provide the name of the institution where the degree was earned and the year the degree was granted.**

Ph.D. Field (66-68) Month and Year Granted (69-71) Institution (72-77)

21. **Date of Birth**

Mo. Day Year

___ ___ ___ (10-14)

22. **Citizenship**

1 ☐ U.S. Native Born
2 ☐ U.S. Naturalized
3 ☐ Non-U.S., Immigrant (Perm. Res.)
4 ☐ Non-U.S., Immigrant (Temp. Res.) (15)

IF NON-U.S., specify country of citizenship _____ (16-17)

23a. **What is your marital status?**

1 ☐ Now Married
2 ☐ Widowed
3 ☐ Never Married
4 ☐ Divorced, separated (18)

23b. **Do you have any children living with you who are:**

Under 6 years of age? 1 ☐ Yes How many? _____ 2 ☐ No (19-20)

Between 6 and 18 years of age? 1 ☐ Yes How many? _____ 2 ☐ No (21-22)

24. **Are you physically handicapped?** 1 ☐ Yes 2 ☐ No (23) If Yes, enter number(s) from below _____ (24-27)

1. Visual 2. Auditory 3. Ambulatory 4. Other, specify _____

25a. **What is your racial background?**

1 ☐ American Indian or Alaskan Native
2 ☐ Asian or Pacific Islander
3 ☐ Black
4 ☐ White (28)

25b. **Is your ethnic heritage Hispanic?**

1 ☐ Yes
2 ☐ No (29)

If Yes, is it:
1 ☐ Mexican-American
2 ☐ Puerto Rican
3 ☐ Other Hispanic (30)

Thank you for completing this questionnaire. Please return the completed form in the enclosed envelope to the Commission on Human Resources, JH638, National Research Council, 2101 Constitution Avenue, Washington, D.C. 20418.

DEGREE AND EMPLOYMENT SPECIALTIES LIST

MATHEMATICAL SCIENCES

000 - Algebra
010 - Analysis & Functional Analysis
020 - Geometry
030 - Logic
040 - Number Theory
052 - Probability
055 - Math. Statistics (see also 544, 670, 725, 727)
060 - Topology
082 - Operations Research (see also 478)
085 - Applied Mathematics
089 - Combinatorics & Finite Mathematics
091 - Physical Mathematics
098 - Mathematics, General
099 - Mathematics, Other*

COMPUTER SCIENCES

071 - Theory
072 - Software Systems
073 - Hardware Systems
074 - Intelligent Systems
079 - Computer Sciences, Other (see also 437, 476)

PHYSICS & ASTRONOMY

101 - Astronomy
102 - Astrophysics
110 - Atomic & Molecular
120 - Electromagnetism
130 - Mechanics
132 - Acoustics
134 - Fluids
135 - Plasma
136 - Optics
138 - Thermal
140 - Elementary Particles
150 - Nuclear Structure
160 - Solid State
198 - Physics, General
199 - Physics, Other*

CHEMISTRY

200 - Analytical
210 - Inorganic
215 - Synthetic Inorganic & Organometallic
220 - Organic
225 - Synthetic Organic & Natural Products
230 - Nuclear
240 - Physical
245 - Quantum
250 - Theoretical
255 - Structural
260 - Agricultural & Food
265 - Thermodynamics & Material Properties
270 - Pharmaceutical
275 - Polymers
280 - Biochemistry (see also 540)
285 - Chemical Dynamics
298 - Chemistry, General
299 - Chemistry, Other*

EARTH, ENVIRONMENTAL AND MARINE SCIENCES

301 - Mineralogy, Petrology
305 - Geochemistry
310 - Stratigraphy, Sedimentation
320 - Paleontology
330 - Structural Geology
341 - Geophysics (Solid Earth)
350 - Geomorph. & Glacial Geology
391 - Applied Geol., Geol. Engr. & Econ. Geol.
395 - Fuel Tech. & Petrol. Engr. (see also 479)
360 - Hydrology & Water Resources
370 - Oceanography
397 - Marine Sciences, Other*
381 - Atmospheric Physics & Chemistry
382 - Atmospheric Dynamics
383 - Atmospheric Sciences, Other*
388 - Environmental Sciences, General (see also 480, 528)
389 - Environmental Sciences, Other*
398 - Earth Sciences, General
399 - Earth Sciences, Other*

ENGINEERING

400 - Aeronautical & Astronautical
410 - Agricultural
415 - Biomedical
420 - Civil
430 - Chemical
435 - Ceramic
437 - Computer
440 - Electrical
445 - Electronics
450 - Industrial & Manufacturing
455 - Nuclear
460 - Engineering Mechanics
465 - Engineering Physics
470 - Mechanical
475 - Metallurgy & Phys. Met. Engr.
476 - Systems Design & Systems Science (see also 072, 073, 074)
478 - Operations Research (see also 082)
479 - Fuel Technology & Petrol. Engr. (see also 395)
480 - Sanitary & Environmental
486 - Mining
497 - Materials Science
498 - Engineering, General
499 - Engineering, Other*

AGRICULTURAL SCIENCES

500 - Agronomy
501 - Agricultural Economics
502 - Animal Husbandry
503 - Food Science and/or Technology (see also 573)
504 - Fish & Wildlife
505 - Forestry
506 - Horticulture
507 - Soils & Soil Science
510 - Animal Science & Animal Nutrition
511 - Phytopathology
518 - Agriculture, General
519 - Agriculture, Other*

MEDICAL SCIENCES

520 - Medicine & Surgery
522 - Public Health & Epidemiology
523 - Veterinary Medicine
524 - Hospital Administration
526 - Nursing
527 - Parasitology
528 - Environmental Health
534 - Pathology
536 - Pharmacology
537 - Pharmacy
538 - Medical Sciences, General
539 - Medical Sciences, Other*

BIOLOGICAL SCIENCES

540 - Biochemistry (see also 280)
542 - Biophysics
543 - Biomathematics
544 - Biometrics and Biostatistics (see also 055, 670, 725, 727)
545 - Anatomy
546 - Cytology
547 - Embryology
548 - Immunology
550 - Botany
560 - Ecology
562 - Hydrobiology
564 - Microbiology & Bacteriology
566 - Physiology, Animal
567 - Physiology, Plant
569 - Zoology
570 - Genetics
571 - Entomology
572 - Molecular Biology
573 - Food Science and/or Technology (see also 503)
574 - Behavior/Ethology
576 - Nutrition & Dietetics
578 - Biological Sciences, General
579 - Biological Sciences, Other*

PSYCHOLOGY

600 - Clinical
610 - Counseling & Guidance
620 - Developmental & Gerontological
630 - Educational
635 - School Psychology
641 - Experimental
642 - Comparative
643 - Physiological
650 - Industrial & Personnel
660 - Personality
670 - Psychometrics (see also 055, 544, 725, 727)
680 - Social
698 - Psychology, General
699 - Psychology, Other*

SOCIAL SCIENCES

700 - Anthropology
703 - Archeology
708 - Communications*
709 - Linguistics
710 - Sociology
720 - Economics (see also 501)
725 - Econometrics (see also 055, 544, 670, 727)
727 - Social Statistics (see also 055, 544, 670, 725)
740 - Geography
745 - Area Studies*
751 - Political Science
752 - Public Administration
755 - International Relations
760 - Criminology & Criminal Justice
770 - Urban & Regional Planning
775 - History & Philosophy of Science
798 - Social Sciences, General
799 - Social Sciences, Other*

HUMANITIES

802 - History & Criticism of Art
804 - History, American
805 - History, European
806 - History, Other*
808 - American Studies
809 - Theater & Theater Criticism
830 - Music
831 - Speech as a Dramatic Art (see also 885)
834 - Philosophy
836 - Comparative Literature
891 - Library & Archival Sciences
878 - Humanities, General
879 - Humanities, Other*

LANGUAGES & LITERATURE

811 - American
812 - English
821 - German
822 - Russian
823 - French
824 - Spanish & Portuguese
826 - Italian
827 - Classical*
829 - Other Languages*

EDUCATION & OTHER PROFESSIONAL FIELDS

801 - Art, Applied
833 - Religion
881 - Theology
882 - Business Administration
883 - Home Economics
884 - Journalism
885 - Speech & Hearing Sciences (see also 831)
886 - Law, Jurisprudence
887 - Social Work
897 - Professional Field, Other*
938 - Education (other than teaching in a field listed above)
899 - Other Fields*

*Identify the specific field in the space on the questionnaire

LIST OF FEDERAL SUPPORTING AGENCIES (For use with #14)

1 Agency for International Development
2 Environmental Protection Agency
3 National Aeronautics & Space Administration
4 National Endowment for the Arts
5 National Endowment for the Humanities
6 National Science Foundation
7 Nuclear Regulatory Commission
8 Smithsonian Institution
9 Department of Agriculture
10 Department of Commerce
11 Department of Defense
12 Department of Energy
13 National Institutes of Health (DHHS)
14 Alcohol, Drug Abuse & Mental Health Administration (NIAA, NIDA, NIMH)
15 Other DHHS, specify _____
16 National Institute of Education (E.D.)
17 Other Department of Education (E.D.)
18 Department of Housing and Urban Development
19 Department of the Interior
20 Department of Justice
21 Department of Labor
22 Department of State
23 Department of Transportation
24 Other agency or department, specify _____
25 Don't know source agency

OMB No. 3145-0020

1981 SURVEY OF DOCTORATE RECIPIENTS

ABBREVIATED QUESTIONNAIRE

CONDUCTED BY THE NATIONAL RESEARCH COUNCIL WITH THE SUPPORT OF THE NATIONAL SCIENCE FOUNDATION, THE NATIONAL ENDOWMENT FOR THE HUMANITIES, THE NATIONAL INSTITUTES OF HEALTH, AND THE DEPARTMENT OF ENERGY

If your name and address are incorrect, please enter correct information below.

_____

_____

_____

Listed below are responses that you provided to us in previous surveys. Please check the preprinted information to determine if it accurately reports your employment data as of FEBRUARY 1981. If the data are correct, please write NC in the change column. If the data are no longer correct, please enter the corrected information in the spaces provided.

	Previous Survey Response	Changes as of FEBRUARY 1981
Date of Birth		
Major Field of Doctorate		
Institution/Year of Doctorate		
Employment Status		
Employment Specialty		
Type of Employer		
Primary Work Activity		
Academic Rank		
Tenure Status		

Please give the name of your principal employer (company, organization, postdoctoral institution, etc., or, if self employed, write "self") and actual place of employment during FEBRUARY 1981.

_____
Name of Employer

_____
Number Street

_____
City State ZIP code

What was the basic annual salary associated with your principal professional employment during FEBRUARY 1981? If you were on a postdoctoral appointment, what was your stipend plus allowances?

$_____ per year

Check whether salary was for ___9-10 months

___11-12 months

Thank you for completing this questionnaire. Please return the completed form in the enclosed envelope to the Commission on Human Resources, JH638, National Research Council, 2101 Constitution Avenue, Washington, D.C. 20418.

NOTE: This information is solicited under the authority of the National Science Foundation Act of 1950, as amended. All information you provide will be treated as confidential, will be safeguarded in accordance with the provisions of the Privacy Act of 1974, and will be used for statistical purposes only. Information will be released only in the form of statistical summaries or in a form which does not identify information about any particular person. Your response is entirely voluntary and your failure to provide some or all of the requested information will in no way adversely affect you.

APPENDIX B

ADJUSTMENTS TO 1981 DOCTORAL LABOR FORCE ESTIMATES

Throughout this report population estimates cited for doctoral scientists, engineers, and humanists residing in the United States in February 1981 include doctoral recipients who earned their degrees from January 1, 1938 through June 30, 1980. A more precise estimate of the February 1981 doctoral labor force would also include those Ph.D.s earned between July 1, 1980 and January 31, 1981. Selected demographic characteristics of these most recent Ph.D.s in science/engineering and the humanities are presented in Tables B.1 and B.2.

Table B.1 Demographic Characteristics by Field of Science/Engineering
(July 1, 1980 to January 31, 1981 graduates)

	Field of Doctorate											
	All Fields	Math	Comp Sci	Phys/ Astrn	Chem	Envir Sci	Engr	Agri Sci	Med Sci	Bio Sci	Psych	Soc Sci
Total Population	9098	360	135	498	805	265	1128	456	416	1661	1787	1587
Sex												
Male	6842	298	117	466	700	240	1086	393	258	1161	1014	1109
Female	2256	62	18	32	105	25	42	63	158	500	773	478
Racial/Ethnic Group												
White	7103	267	111	349	604	235	635	358	342	1383	1570	1249
Minority Group+	1415	84	17	106	144	19	415	76	46	179	130	199
No Report	580	9	7	43	57	11	78	22	28	99	87	139
Citizenship#												
U.S. Native	7147	247	104	350	621	229	522	352	354	1441	1652	1275
U.S. Naturalized	284	17	3	20	23	2	55	5	10	47	49	53
Non-U.S., Immigrant	432	19	11	27	47	5	132	24	20	60	15	72
Non-U.S., Non-Immigrant	962	75	15	87	91	25	366	63	17	77	23	123
No Report	273	2	2	14	23	4	53	12	15	36	48	64

+Includes Blacks, American Indians, Asians, and Hispanics.
#Excluded from this table are individuals who indicated at the time they received their doctorate that they planned to leave the United States.

Source: National Research Council, Doctorate Records File.

Table B.2 Demographic Characteristics by Field of Humanities Doctorate
(July 1, 1980 to January 31, 1981 graduates)

	Field of Doctorate									
	All Fields	Hist	Art Hist	Music	Speech/ Theater	Phil- osophy	Other Human- ities	Eng/Amer Lang & Lit	Class Lang & Lit	Modern Lang & Lit
Total Population	1625	339	63	172	72	139	65	416	26	333
Sex										
Male	915	225	12	131	45	112	31	193	15	151
Female	710	114	51	41	27	27	34	223	11	182
Racial/Ethnic Group										
White	1359	278	58	145	61	121	50	359	23	264
Minority Group+	158	39	2	12	4	9	10	26	1	55
No Report	108	22	3	15	7	9	5	31	2	14
Citizenship#										
U.S. Native	1385	298	59	154	66	121	59	369	24	235
U.S. Naturalized	83	17	1	3		7	4	12		39
Non-U.S., Immigrant	62	7		1		5		8		41
Non-U.S., Non-Immigrant	35	7	1	2	1	4	2	10		8
No Report	60	10	2	12	5	2		17	2	10

+Includes Blacks, American Indians, Asians, and Hispanics.
#Excluded from this table are individuals who indicated at the time they received their doctorate that they planned to leave the United States.

Source: National Research Council, Doctorate Records File.

APPENDIX C

SAMPLING FRAME

Sampling Frame

Data from the Survey of Doctorate Recipients (SDR) are collected biennially from a stratified random sample of Ph.D. scientists, engineers, and humanists. A longitudinal data base has been constructed from the five surveys conducted since 1973. For each survey, adjustments have been made to both the sampling frame and the sample. These revisions have significant implications when comparing the results of one survey to the results of another.

1973

In 1973 a sample of approximately 59,100 was randomly selected from a sampling frame (population) of 261,400 individuals who earned doctorates in science or engineering between January 1, 1930 and June 30, 1972 or who earned nonscience/nonengineering Ph.D.s in the same period but who were identified as being employed in a science or engineering position (see Appendix D, Table D.5). The sample was stratified by year of doctorate, field of doctorate or employment, sex, size of Ph.D. institution (in terms of the number of Ph.D. degrees granted), and degree category (i.e., science and engineering Ph.D.s from U.S. institutions--segment 1; nonscience Ph.D.s from U.S. institutions for individuals who subsequently switched to a science employment field--segment 2; and holders of doctorates from foreign institutions who were employed in the United States--segment 3).

The sampling frame for segment 1 was the NRC's Doctorate Records File (DRF), a file which contains nearly all Ph.D.s awarded from U.S. universities between 1920 to the present. Segment 2 cases were drawn from the NSF's National Register of Scientific and Technical Personnel (1970). Segment 3 cases were selected from college catalogs, professional directories, and rosters of employees obtained from several large U.S. business/industrial firms.

1975

Individuals who earned their Ph.D. degrees in science/engineering

between July 1, 1972 and June 30, 1974 were added to segment 1 of the SDR roster prior to the 1975 survey. A random, stratified sample of these Ph.D.s was added to the 1975 survey sample, and 1930-1931 Ph.D.s were deleted from the sample, leaving a sample of approximately 62,470 Ph.D.s (see Appendix D, Table D.4).

A revision in the stratification criteria resulted in the deletion of size of Ph.D. institution as a stratifying variable, and the addition of racial/ethnic classification. The source of data for the racial/ethnic variable was the Survey of Earned Doctorates (Doctorate Records File or DRF). However, because data on racial/ethnic identification was not collected until 1973, a large portion of the sample could not be classified.

1977

The cohort adjustments were again made to maintain a 42-year time span (January 1, 1934 to June 30, 1976) for scientists and engineers.

Individuals who indicated in the Survey of Earned Doctorates that they were foreign citizens and planned to depart the United States following receipt of their doctorates were deleted from the 1977 sampling frame on the assumption that there was a high probability they would remain outside the U.S. labor force.

Ph.D. recipients in the humanities field who earned their degrees between January 1, 1930 and June 30, 1976 were added to segment 1 of the sampling frame in 1977. A stratified random sample of these Ph.D.s was added to the survey sample. In view of the fact that the 1930-1933 humanities Ph.D.s were not included as part of the 1973 and 1975 surveys, these Ph.D.s were included in the 1977 survey. Ph.D.s in the humanities were deleted from segment 2, leaving only doctorate recipients in education and other professional fields in segment 2. The 1977 survey sample was approximately 83,550 (see Appendix D, Table D.3).

1979

The 1979 sampling frame was adjusted to include only Ph.D.

recipients who had earned their degrees between January 1, 1936 and June 30, 1978.

In the nonresponse bias study of the 1975 Survey of Doctorate Recipients, it was discovered that the survey nonrespondents consisted of higher percentages of foreign citizens and foreign residents. To adjust for this bias, citizenship was added as a stratification variable. The 1979 sample consisted of approximately 51,710 Ph.D.s (see Appendix C, Table C.2), an overall sampling rate of 11.8 percent.

1981

For the 1981 Survey, the cohort adjustments were again made to maintain a 42-year time span (January 1, 1938 to June 30, 1980 Ph.D.s). In addition, the overall sampling rate for FY1973-76 Ph.D.s was increased from 11.9 percent to 15 percent on a one-time basis in 1981, to provide sufficient responses for a special SDR report on recent doctorate recipients that was planned for 1982. The 1981 sampling frame also included individuals who earned their doctoral degrees between July 1980 and February 1981; the population of these 8-months of Ph.D.s, however, was incomplete at the time the sample was selected. The 1981 sample was 65,391 Ph.D.s (see Appendix C, Table C.1), an overall sampling rate of 13.5 percent.

Sampling Rates and Sample Attrition

For the 1973, 1975, and 1977 surveys, the sample rate averaged an overall 21 percent. In 1979, the longitudinal sample was reduced in size because of budgetary constraints. The revised sample, using a sampling rate of 11.8 percent was reviewed to assure that the survey sample was large enough to provide reliable estimates of the Ph.D. population. For the 1981 survey, the sample of FY1973-76 Ph.D.s was increased, resulting in an overall sampling rate of 13.5 percent.

A total of 101,518 individuals have been members of at least one of the five SDR samples. Of these, 29,091 or 28.7 percent have been included in all five samples; 78,102 have responded to at least one of the surveys, and 11,923 have responded to all five surveys.

Effect on Sampling Errors

Obviously, any change in the sample size has an effect on the sampling errors of population estimates. If the proportion of the population possessing a particular characteristic, $\underline{P}$, is being estimated by the statistic p, the standard error of p can be computed by $S.E.(p) = (VAR(\underline{P})/n)^{\frac{1}{2}}$, where $VAR(\underline{P})$ is estimated by $(p(1-p))$, and p equals the sample proportion and n equals the sample size.

This formula is equivalent to $S.E.(p) = [S.D.(\underline{P})]/(n)$, where $S.D.(\underline{P})$ is the standard deviation of $\underline{P}$. Holding $S.D.(\underline{P})$ fixed, the sampling error, S.E.(p), will vary as n is adjusted by a factor k: $S.E.(p) = [S.D.(\underline{P})]/(kn)^{\frac{1}{2}}$ or $S.E.(p) = [S.D.(\underline{P})]/(k)^{\frac{1}{2}} \cdot (n)^{\frac{1}{2}}$. If the sample size is increased to $\acute{n}$, $k = \acute{n}/n$. In this case the sampling error is reduced by a factor of $1/(k)^{\frac{1}{2}}$.

For example, if the sample p equals 0.2, the estimated $S.D.(\underline{P}) = (0.2(1-0.2))^{\frac{1}{2}} = 0.4$. If n is 100, $S.E.(p) = (0.4/(100)^{\frac{1}{2}}) = 0.04$. If n is increased to 1600, $S.E.(p) = (0.4/(1600)^{\frac{1}{2}}) = 0.01$. Here k = 16 and the sampling error has been reduced to $1/(k)^{\frac{1}{2}}$th its original value.

If the sample size is decreased to $\acute{n}$, $k = \acute{n}/n$ 1. In this case, the sampling error is increased by a factor of $1/(k)^{\frac{1}{2}}$. In the previous example, if the initial sample size equalled 1600, k = (100/1600) = 1/16. The sampling error increased from 0.01 to 0.04, a factor of $1/(1/16)^{\frac{1}{2}}$ or 4.

For the 1981 SDR the sampling frame or population is 483,632. If the previous 21 percent sampling rate had been applied, the 1981 sample would have been 101,563. The actual 1981 sample is 65,391. The expected effect on sampling errors for estimates of the total population can be approximated by computing k = (65,391/101,563) = .644 and $1/(k)^{\frac{1}{2}} = 1.25$. Thus for a fixed standard deviation, the sampling error should be approximately 1/4 higher under the 1981 sampling scheme.

In these computations, the effects of the finite population correction factor have been ignored. The f.p.c. equals (N-n)/(N-1) and has little effect on sampling error estimates for large

populations and low sampling rates. However, although the overall sampling rate for the 1981 SDR sample is 13.5 percent, sampling rates for the strata range from approximately 2 percent to 100 percent. Thus computation of sampling errors that take into account sample stratification should result in lower sampling error estimates than computations that disregard the sample design.

Finally, this discussion applies only to the total sample n and does not address the issue of less than complete survey response, which will of course effectively reduce the sample and thus increase the sampling error. The effects of nonresponse bias are discussed in Appendix G.

APPENDIX D

RESPONSE RATES

TABLE D.1 Response Rates for the 1981 Survey of Doctorate Recipients in Science, Engineering, and the Humanities

	Sampling Frame[a] (N)	Sample (n)	Survey Sample[b] (n)	Contacted[c] (n)	Survey Responses[d] (n)	Response Rates[e] A (%)	B (%)
Total	483,632	65,391	63,022	56,511	39,547	62.8	70.0
Field of Doctorate/Employment[f]							
Mathematics/Computer Sci.	21,931	4,595	4,499	3,967	2,729	60.7	68.8
Physics/Astronomy	32,335	3,738	3,647	3,297	2,282	62.6	69.2
Chemistry	52,726	5,630	5,523	4,858	3,435	62.2	70.7
Environmental Sciences	12,305	2,748	2,673	2,376	1,755	65.7	73.9
Engineering	56,943	3,883	3,814	3,324	2,159	56.6	65.0
Life Sciences	100,072	17,713	17,172	15,623	11,393	66.3	72.9
Psychology	49,137	6,084	5,886	5,238	3,765	64.0	71.9
Social Sciences	62,682	5,545	5,285	4,825	3,374	63.8	69.9
Natural Sciences[g]	1,601	282	151	145	108	71.5	74.5
Physical Sciences[g]	536	370	368	313	155	42.1	49.5
Behavioral Sciences[g]	3,592	285	200	185	121	60.5	65.4
All S/E Fields[g]	2,507	345	232	212	158	68.1	74.5
History	20,994	1,818	1,754	1,557	1,086	61.9	69.7
Art History	2,163	840	802	731	497	62.0	68.0
Music	5,125	877	839	776	574	68.4	74.0
Speech	4,920	902	795	725	500	62.9	69.0
Philosophy	6,519	1,393	1,353	1,160	737	54.5	63.5
English/American Literature	23,604	2,281	2,207	1,917	1,282	58.1	66.9
Classical Lang./Literature	2,036	732	697	646	447	64.1	69.2
Modern Lang./Literature	13,287	2,761	2,678	2,429	1,564	58.4	64.4
Other Humanities	3,496	1,036	994	910	669	67.3	73.5
Languages[g]	563	236	231	198	114	49.4	57.6
Other Humanities[g]	1,790	768	746	679	409	54.8	60.2
All Humanities Fields[g]	1,880	417	410	370	204	49.8	55.1
Field Unknown	528	112	66	50	30	45.5	60.0
Year of Doctorate							
CY1938-CY1957	87,302	11,715	10,290	9,543	6,981	67.8	73.2
CY1958-FY1965	74,680	8,299	7,858	7,370	5,297	67.4	71.9
FY1966-FY1969	69,082	7,494	7,235	6,661	4,722	65.3	70.9
FY1970-FY1974	113,730	15,682	15,526	13,692	9,370	60.4	68.4
FY1975-FY1978	86,977	14,451	14,413	12,590	8,385	58.2	66.6
FY1979-Feb.1981	50,455	7,126	7,123	6,258	4,553	63.9	72.8
Merged Cohorts[h]	731	420	392	285	184	46.9	64.6
Cohort Unknown	675	204	135	112	55	29.7	49.1
Sex							
Male	411,031	41,785	40,233	36,263	25,235	62.7	69.6
Female	72,601	23,606	22,789	20,248	14,312	62.8	70.7
Racial/Ethnic Group							
White/Unknown	461,825	57,316	54,990	49,590	35,539	64.6	71.7
Minority Group[i]	21,807	8,075	8,032	6,921	4,008	49.9	57.9
Citizenship							
U.S.	342,326	44,741	43,956	39,767	29,055	66.1	73.1
Foreign	46,217	7,583	7,515	6,308	2,948	39.2	46.7
Unknown	95,089	13,067	11,551	10,436	7,544	65.3	72.3
Location of Ph.D. Institution							
U.S.	472,044	63,637	61,380	55,291	38,763	63.2	70.1
Foreign	11,588	1,754	1,642	1,220	784	47.7	64.3

[a] The sampling frame includes those deceased, those residing in foreign countries, and those with doctorates in education or professional fields who were working in science and engineering. Hence, these numbers exceed the population estimates shown in the other tables of this report.

[b] The survey sample is the sample size minus persons known to be deceased or out-of-scope prior to the 1981 survey. The out-of-scope classification is assigned to an individual who indicated in a previous survey that he or she:

a) holds a doctorate in education or a professional field and works in a nonscience/nonengineering position or

b) holds a Ph.D. degree from a foreign institution, is a foreign citizen, and resides in a foreign country.

[c] The number assumed contacted equals the survey sample minus those individuals for whom no valid addresses could be obtained.

[d] Responses include individuals found to be deceased in the 1981 survey and persons residing in foreign countries in 1981.

[e] Response rate "A" is the number of 1981 survey responses divided by the number in the survey sample. Response rate "B" is the number of 1981 survey responses divided by the number assumed to have been contacted.

[f] Individuals who earned doctorates in science, engineering, or the humanities were stratified by field of degree. Those with doctorates in education or professional fields who were identified as working in science or engineering were stratified by field of employment.

[g] Merged fields created for certain small subgroups when sample was reduced.

[h] Merged cohorts created for certain small subgroups when sample was reduced.

[i] Includes only those individuals whose racial/ethnic group was known at the time the sample was selected.

TABLE D.2 Response Rates for the 1979 Survey of Doctorate Recipients in Science, Engineering, and the Humanities

	Sampling Frame[a] (N)	Sample (n)	Survey Sample[b] (n)	Contacted[c] (n)	Survey Responses[d] (n)	Response Rates[e] A (%)	B (%)
Total	438,078	51,711	49,671	45,994	32,877	66.2	71.5
Field of Doctorate/Employment[f]							
Mathematics/Computer Sci.	19,875	3,582	3,497	3,229	2,170	62.1	67.2
Physics/Astronomy	30,422	3,139	3,058	2,856	1,985	64.9	69.5
Chemistry	50,179	4,360	4,262	3,912	2,782	65.3	71.1
Environmental Sciences	11,050	2,096	2,025	1,898	1,429	70.6	75.3
Engineering	51,850	2,793	2,734	2,473	1,684	61.6	68.1
Life Sciences	89,515	15,064	14,564	13,588	9,858	67.7	72.5
Psychology	41,776	4,691	4,520	4,170	2,964	65.6	71.1
Social Sciences	55,819	4,896	4,654	4,323	2,984	64.1	69.0
Natural Sciences[g]	1,483	244	124	120	95	76.6	79.2
Physical Sciences[g]	227	221	221	192	104	47.1	54.2
Behavioral Sciences[g]	3,766	215	146	136	107	73.3	78.7
All S/E Fields[g]	2,568	349	253	235	174	68.8	74.0
History	19,627	1,141	1,088	1,023	763	70.1	74.6
Art History	1,893	666	643	603	470	73.1	77.9
Music	4,395	686	660	618	496	75.2	80.3
Speech	4,857	786	749	699	533	71.2	76.3
Philosophy	6,158	804	774	708	492	63.6	69.5
English/American Literature	21,782	1,227	1,158	1,084	786	67.9	72.5
Classical Lang./Literature	2,036	635	602	561	402	66.8	71.7
Modern Lang./Literature	12,268	2,156	2,080	1,892	1,393	67.0	73.6
Other Humanities	2,805	801	764	711	566	74.1	79.6
Languages[g]	453	194	190	170	103	54.2	60.6
Other Humanities[g]	959	494	480	434	308	64.2	71.0
All Humanities Fields[g]	1,804	358	354	306	200	56.5	65.4
Field Unknown	531	113	71	53	29	40.8	54.7
Year of Doctorate							
CY1936-CY1957	92,193	12,343	11,012	10,251	7,546	68.5	73.6
CY1958-FY1965	74,687	8,299	7,951	7,455	5,340	67.2	71.6
FY1966-FY1969	69,089	7,494	7,289	6,731	4,775	65.5	70.9
FY1970-FY1974	113,735	12,172	12,072	11,132	7,801	64.6	70.1
FY1975-FY1976	44,695	5,235	5,232	4,855	3,397	64.9	70.0
FY1977-FY1978	42,267	5,523	5,520	5,141	3,766	68.2	73.3
Merged Cohorts[h]	747	441	410	310	201	49.0	64.8
Cohort Unknown	675	204	185	119	51	27.6	42.9
Sex							
Male	378,074	33,752	32,400	30,137	21,457	66.2	71.2
Female	60,004	17,959	17,271	15,857	11,420	66.1	72.0
Racial/Ethnic Group							
White/Unknown	423,419	47,057	45,043	41,811	30,308	67.3	72.5
Minority Group[i]	14,659	4,654	4,628	4,183	2,569	55.5	61.4
Citizenship							
U.S.	298,561	32,634	32,065	30,204	22,350	69.7	74.0
Foreign	39,522	5,361	5,313	4,602	2,368	44.6	51.5
Unknown	99,995	13,716	12,293	11,188	8,159	66.4	72.9
Location of Ph.D. Institution							
U.S.	426,201	49,907	47,981	44,698	32,018	66.7	71.6
Foreign	11,877	1,804	1,690	1,296	859	50.8	66.3

[a] The sampling frame includes those deceased, those residing in foreign countries, and those with doctorates in education or professional fields who were working in science and engineering. Hence, these numbers exceed the population estimates shown in the other tables of this report.

[b] The survey sample is the sample size minus persons known to be deceased or out-of-scope prior to the 1979 survey. The out-of-scope classification is assigned to an individual who indicated in a previous survey that he or she:

a) holds a doctorate in education or a professional field and works in a nonscience/nonengineering position, or

b) holds a Ph.D. degree from a foreign institution, is a foreign citizen, and resides in a foreign country.

[c] The number assumed contacted equals the survey sample minus those individuals for whom no valid addresses could be obtained.

[d] Responses include individuals found to be deceased in the 1979 survey and persons residing in foreign countries in 1979.

[e] Response rate "A" is the number of 1979 survey responses divided by the number in the survey sample. Response rate "B" is the number of 1979 survey responses divided by the number assumed to have been contacted.

[f] Individuals who earned doctorates in science, engineering, or the humanities were stratified by field of degree. Those with doctorates in education or professional fields who were identified as working in science or engineering were stratified by field of employment.

[g] Merged fields created for certain small subgroups when sample was reduced.

[h] Merged cohorts created for certain small subgroups when sample was reduced.

[i] Includes only those individuals whose ethnic group was known at the time the sample was selected.

TABLE D.3 Response Rates for the 1977 Survey of Doctorate Recipients in Science, Engineering, and the Humanities

	Sampling Frame* (N)	Sample (n)	Survey Sample+ (n)	Contacted# (n)	Survey Responses** (n)	Response Rates++ A (%)	Response Rates++ B (%)
Total	402,383	83,546	79,375	73,698	50,648	63.8	68.7
Field of Doctorate/Employment##							
Mathematics/Computer Sciences	19,384	5,141	4,776	4,472	2,873	60.2	64.2
Physics/Astronomy	28,861	6,013	5,795	5,395	3,609	62.3	66.9
Chemistry	48,260	9,148	8,786	8,213	5,736	65.3	69.8
Earth Sciences	10,004	2,197	2,095	1,954	1,457	69.5	74.6
Engineering	47,590	7,667	7,506	6,779	4,429	59.0	65.3
Life Sciences (Agricultural, Medical and Biological)	82,060	20,104	19,359	18,062	12,707	65.6	70.4
Psychology	40,601	8,390	7,772	7,375	4,994	64.3	67.7
Social Sciences	50,622	9,282	8,653	7,927	5,187	59.9	65.4
History	19,257	2,784	2,620	2,459	1,809	69.0	73.6
Art History	1,722	643	616	575	430	69.8	74.8
Music	3,910	929	890	835	621	69.8	74.4
Speech	4,913	1,038	991	926	653	65.9	70.5
Philosophy	6,214	1,186	1,131	1,030	681	60.2	66.1
Other Humanities	2,202	1,059	1,003	932	705	70.3	75.6
English/American Literature	20,891	2,859	2,730	2,548	1,830	67.0	71.8
Classics	2,282	706	661	612	448	67.8	73.2
Modern Languages	12,641	3,810	3,625	3,294	2,278	62.8	69.2
Unknown	969	590	366	310	201	54.9	64.8
Year of Doctorate							
CY1930-49	42,954	10,025	8,384	7,630	5,444	64.9	71.3
CY1950-FY1961	85,740	16,864	15,800	14,904	10,455	66.2	70.1
FY1962-69	114,461	25,496	24,317	22,649	15,407	63.4	68.0
FY1970-74	113,743	21,726	21,470	19,788	13,210	61.5	66.8
FY1975-76	44,713	9,109	9,106	8,508	6,040	66.3	71.0
Unknown	772	326	298	219	92	30.9	42.0
Ph.D. Institution							
U.S.	390,266	78,464	74,574	68,708	48,108	64.5	69.0
Foreign	12,117	5,082	4,801	3,990	2,540	52.9	63.7
Sex							
Male	351,110	64,041	60,840	56,754	38,791	63.8	68.3
Female	51,273	19,505	18,535	16,944	11,857	64.0	70.0
Race/Ethnic Group							
Minority Group***	9,176	5,177	5,145	4,700	2,743	53.3	58.4
White/Unknown	393,207	78,369	74,230	68,998	47,905	64.5	69.4

* The sampling frame includes those deceased, those residing in foreign countries, and those with doctorates in education or professional fields who were working in science or engineering.

\+ The survey sample is the sample size minus persons known to be deceased or out-of-scope prior to the 1977 survey. The out-of-scope classification is assigned to an individual who indicated in a previous survey that he or she:
a) holds a doctorate in education or a professional field and works in a nonscience/nonengineering position, or
b) holds a Ph.D. degree from a foreign institution, is a foreign citizen, and resides in a foreign country.

\# The number assumed contacted equals the survey sample minus those individuals for whom no valid addresses could be obtained.

** Responses include individuals found to be deceased in the 1977 survey and persons residing in foreign countries in 1977.

++ Response rate "A" is the number of 1977 survey responses divided by the number in the survey sample. Response rate "B" is the number of 1977 survey responses divided by the number assumed to have been contacted.

Individuals who earned doctorates in science, engineering, or the humanities were stratified by field of degree. Those with doctorates in education or professional fields who were identified as working in science or engineering were stratified by field of employment.

***Includes only those individuals whose ethnic group was known at the time the sample was selected.

TABLE D.4 Response Rates for the 1975 Survey of Doctorate Recipients in Science and Engineering

	Sampling Frame* (N)	Sample (n)	Survey Sample+ (n)	Contacted# (n)	Survey Responses** (n)	Response Rates++ A (%)	B (%)
Total	295,970	62,471	59,608	55,412	41,905	70.3	75.6
Field of Doctorate/Employment##							
Mathematics/Computer Sciences	17,577	4,706	4,423	4,157	3,018	68.2	72.6
Physics/Astronomy	26,771	5,527	5,343	4,984	3,694	69.1	74.1
Chemistry	45,770	8,501	8,178	7,532	5,836	71.4	77.5
Earth Sciences	9,094	2,040	1,947	1,837	1,453	74.6	79.1
Engineering	42,543	6,840	6,709	6,162	4,635	69.1	75.2
Life Sciences (Agricultural, Medical and Biological)	73,817	18,243	17,599	16,436	12,822	72.9	78.0
Psychology	35,290	7,659	7,186	6,676	4,965	69.1	74.4
Social Sciences	44,118	8,351	7,802	7,257	5,203	66.7	71.7
Unknown	990	604	421	371	279	66.3	75.2
Year of Doctorate							
CY1932-49	35,935	8,396	7,346	6,817	5,254	71.5	77.1
CY1950-FY1961	71,739	14,260	13,535	12,781	9,745	72.0	76.2
FY1962-69	95,797	22,045	21,153	19,643	14,720	69.6	74.9
FY1970-72	55,208	10,461	10,296	9,588	7,267	70.6	75.8
FY1973-74	36,519	6,983	6,977	6,343	4,796	68.7	75.6
Unknown	772	326	301	240	123	40.9	51.3
Ph.D. Institution							
U.S.	283,630	57,273	54,662	51,260	38,901	71.2	75.9
Foreign	12,340	5,198	4,946	4,152	3,004	60.7	72.4
Sex							
Male	268,041	49,869	47,615	44,372	33,589	70.5	75.7
Female	27,929	12,602	11,993	11,040	8,316	69.3	75.3
Race/Ethnic Group							
Minority Group***	3,596	1,780	1,778	1,595	1,056	59.4	66.2
White/Unknown	292,374	60,691	57,830	53,817	40,849	70.6	75.9

* The sampling frame includes those deceased, those residing in foreign countries, and those with doctorates in education or professional fields who were working in science or engineering.

\+ The survey sample is the sample size minus persons known to be deceased or out-of-scope prior to the 1975 survey. The out-of-scope classification is assigned to an individual who indicated in a pervious survey that he or she:
a) holds a doctorate in education or a professional field and works in a nonscience/nonengineering position, or
b) holds a Ph.D. degree from a foreign institution, is a foreign citizen, and resides in a foreign country.

\# The number assumed contacted equals the survey sample minus those individuals for whom no valid addresses could be obtained.

** Responses include individuals found to be deceased in the 1975 survey and persons residing in foreign countries in 1975.

++ Response rate "A" is the number of 1975 survey responses divided by the number in the survey sample. Response rate "B" is the number of 1975 survey responses divided by the number assumed to have been contacted.

Individuals who earned doctorates in science and engineering were stratified by field of degree. Those with doctorates in education or professional fields who were identified as working in science or engineering were stratified by field of employment.

***Includes only those individuals whose race or ethnic group was known at the time the sample was selected.

TABLE D.5 Response Rates for the 1973 Survey of Doctorate Recipients in Science and Engineering

	Sampling Frame* (N)	Sample (n)	Survey Sample+ (n)	Contacted# (n)	Survey Responses** (n)	Response Rates++ A (%)	B (%)
Total	261,393	56,096	54,987	51,813	41,024	74.6	79.2
Field of Doctorate/Employment##							
Mathematics/Computer Sciences	15,430	4,199	4,140	3,956	3,041	73.5	76.9
Physics/Astronomy	24,136	4,967	4,896	4,643	3,602	73.6	77.6
Chemistry	42,724	7,765	7,605	7,198	5,799	76.3	80.6
Earth Sciences	8,117	1,889	1,836	1,753	1,468	80.0	83.7
Engineering	36,657	5,987	5,922	5,620	4,426	74.7	78.8
Life Sciences (Agricultural, Medical and Biological)	65,306	16,333	15,979	14,822	12,051	75.4	81.3
Psychology	30,501	6,956	6,829	6,485	5,036	73.7	77.7
Social Sciences	37,581	7,402	7,187	6,784	5,149	71.6	75.9
Unknown	941	598	593	552	452	76.2	81.9
Year of Doctorate							
CY1930-49	38,851	9,112	8,324	7,581	5,983	71.9	78.9
CY1950-FY1961	71,489	14,260	14,033	13,294	10,540	75.1	79.3
FY1962-69	95,438	22,042	21,953	20,710	16,253	74.0	78.5
FY1970-72	55,103	10,356	10,351	9,954	8,078	78.0	81.2
Unknown	512	326	326	274	170	52.1	62.0
Ph.D. Institution							
U.S.	249,979	50,934	49,825	47,378	37,615	75.5	79.4
Foreign	11,414	5,162	5,162	4,435	3,409	66.0	76.9
Sex							
Male	238,438	45,260	44,430	41,972	33,338	75.0	79.4
Female	22,955	10,836	10,557	9,841	7,686	72.8	78.1

* The sampling frame includes those deceased, those residing in foreign countries, and those with doctorates in education or professional fields who were working in science or engineering.

\+ The survey sample is the sample size minus persons known to be deceased prior to the 1973 survey.

\# The number assumed contacted equals the survey sample minus those individuals for whom no valid addresses could be obtained.

** Responses include individuals found to be deceased in the 1973 survey and persons residing in foreign countries in 1973.

++ Response rate "A" is the number of 1973 survey responses divided by the number in the survey sample. Response rate "B" is the number of 1973 survey responses divided by the number assumed to have been contacted.

\## Individuals who earned doctorates in science and engineering were stratified by field of degree. Those with doctorates in education or professional fields who were identified as working in science or engineering were stratified by field of employment.

Note: Race/ethnic group data are available from the NRC's Doctorate Record File beginning with FY 1973 Ph.D. recipients. Therefore, pre-1973 survey information on this variable was not available at the time the sample was selected

APPENDIX E

SAMPLING ERROR

SAMPLING ERROR ESTIMATES FOR RATIOS

Most of the statistics presented in this report are ratios of two weighted sums of observations, i.e., ratios of random variables. Thus, for example, we are concerned with a ratio, $r = y/x$, where

$$y = \sum_h \left[N_h/n_h\right] \sum_i y_{hi}$$

$$x = \sum_h \left[N_h/n_h\right] \sum_i x_{hi}$$

and where y_{hi} and x_{hi} are observations made on the i^{th} response of stratum h, N_h is the number of individuals in the active population of stratum h, and n_h is the number of responses from stratum h.

The estimates of sampling error in this report are computed as if the responses obtained for a stratum are a random sample from that stratum. Strata were combined whenever the number of responses in a stratum was less than two.

The variance of the ratio y/x is estimated by the expression

$$s_r^2 = \left(\frac{y}{x}\right)^2 \left(\frac{s_y^2}{y^2} + \frac{s_x^2}{x^2} - \frac{2s_{xy}}{xy}\right)$$

where

$$s_{xy} = \sum_h \frac{N_h^2}{n_h} \frac{N_h - n_h}{N_h - 1} \frac{1}{n_h - 1} \left(\sum_i \left[x_{hi} - \bar{x}_h\right]\left[y_{hi} - \bar{y}_h\right]\right),$$

$\bar{x}_h$ and $\bar{y}_h$ being the means of the x and y values observed in stratum h, respectively. Similarly, s_x^2 and s_y^2 are defined using $\left[x_{hi} - \bar{x}_h\right]^2$ and $\left[y_{hi} - \bar{y}_h\right]^2$ in the inner summation.

Comparisons can be made between sampling errors computed on the basis of a simple random sample (srs) and those which take into account stratification. Table E.1 presents sampling errors associated with selected statistics from

TABLE E.1 Comparison of Sampling Errors for Selected Statistics

Variable Base and Subcategory	Sample Size of Variable Base	Statistic (%)	Sp (%) (srs)	Sr (%) Stratified
I. SCIENCE/ENGINEERING				
Field of Ph.D.--Total Engineering	29,357	14.7	0.2	0.1
Field of Employment--Total Employed Employed in Mathematics	27,046	4.1	0.1	0.1
Physics/Astronomy Ph.D.--Total Employed Employed in Physics/Astronomy	2,029	61.3	1.1	1.3
Biological Science Ph.D.--Total Female	7,193	19.0	0.5	0.2
Earth/Environmental Science Ph.D.--Total Employed Part-time	1,680	4.0	0.5	0.5
Computer Science Ph.D.--Total Full- or or Part-time Employed Employed in Business or Industry	381	49.7	2.6	4.0
Chemistry Ph.D. (FY1975-1980 Graduates)--Total Full-or Part-time Employed Employed in Teaching	855	12.8	1.1	1.5
1960-1969 Ph.D. Recipients (Male)--Total Academically Employed Hold Rank of Professor	3,068	62.8	0.9	1.0
Labor Force--Total Unemployed, Seeking Employment	27,355	0.8	0.1	0.1
Labor Force--Total Social Science Ph.D. Employed Full-time	2,904	95.4	0.4	0.4
Labor Force--Total Male Unemployed, Seeking Employment	18,630	0.6	<0.1	0.1
Labor Force--Medical Science Ph.D./Female Employed Full-time	567	80.3	1.7	1.8
2. HUMANITIES				
Field of Ph.D.--Total History Ph.D.	7,291	26.7	0.5	0.3
Field of Employment--Total Employed Employed in Music	6,485	6.1	0.3	0.1
History Ph.D.--Total Employed Employed in Other Humanities	1,037	3.9	0.6	0.8
Philosophy Ph.D.--Total Female	744	14.2	1.3	0.4
Modern Language Ph.D.--Total Employed Full-time	1,787	81.5	0.9	1.1
Art History Ph.D.--Total Full- or Part-time Employed Employed in 4-year College/University	389	79.9	2.0	2.0
Speech/Theater Ph.D. (FY1975-1980 Graduates)--Total Full- or Part-time Employed Employed in Management/Administration	111	6.7	2.4	2.8
1960-1969 Ph.D. Recipients (Male)--Total Academically Employed Hold Rank of Professor	693	60.5	1.9	2.4
Labor Force--Total Unemployed, Seeking Employment	6,649	1.5	0.1	0.2
Labor Force--Total Music Ph.D. Employed Full Time	579	88.2	1.3	1.4
Labor Force--Classical Languages and Literature Ph.D., Male Employed Full-time	213	94.7	1.5	1.5
Labor Force--Total Female Unemployed, Seeking Employment	3,238	2.6	0.3	0.3

the report. Bases of various sample sizes and a range of statistic values have been chosen to provide representative comparisons. Sampling errors in the column s_p were computed with the expression $\left(\frac{p[1-p]}{n}\right)^{\frac{1}{2}}$, while those under s_r were calculated with the formula described above, which takes into account the sample design. The statistics are in percentage form and are the estimated proportion of a variable category with a given characteristic, $\frac{1}{n}\sum_{i}^{n} y_i$ (for the purposes of s_p), or the ratio of two random variables, $\frac{y}{x}$ (for the purposes of s_r). Whenever possible, the subgroups examined are the same as those in the 1977 Profile report in order to facilitate comparisons of the effects on sampling errors of sample size reductions.

For the most part, differences between the two error estimates are small. Calculations based on an srs are for most statistics the same as or slightly higher than those which take account of the stratification. For statistics which are ratios of two stratifying variables (e.g., the ratio of women philosophy Ph.D.s to total philosophy Ph.D.s), the estimate of sampling error is much higher using the formula for s_p. In certain cases (mainly those involving estimates of type of employer or primary work activity for small subgroups), the use of the formula for an s_p appears to underestimate the sampling error.

Taking these potential discrepancies into account, a useful approximation of the sampling errors of those statistics presented in this report in percentage form can be obtained from Table E.2. This table summarizes sampling errors associated with various proportion values at given sample sizes. Calculations in the table assume a simple random sample.

Values for Table E.2 were computed using the formula $s_p = \left(\frac{p[1-p]}{n}\right)^{\frac{1}{2}}$, in which p is the proportion of a particular category (variable) possessing a certain characteristic, y $\left(\text{i.e., } p = \frac{1}{n}\sum_{i}^{n} y_i\right)$, and n is the number of sample cases in the variable-specified category (e.g., doctoral scientists and engineers in the U.S. labor force). The finite population correction factor, $\text{fpc} = \left([N-n] / [N-1]\right)^{\frac{1}{2}}$, has been omitted from the calculations, since the fpc has negligible effect on most statistics in this report, unless the estimate

applies to a subgroup that has a high sampling rate. In any case, the omission of the fpc in the formula for s_p yields a conservative estimate (i.e., a higher estimate) of the sampling error.

TABLE E.2 Approximate Sampling Errors for Various Statistics and Sample Sizes

Sample Size	Proportion				
	0.01 or 0.99	0.05 or 0.95	0.10 or 0.90	0.25 or 0.75	0.50
37,500	0.00051	0.00113	0.00155	0.00224	0.00258
12,100	0.00090	0.00198	0.00273	0.00394	0.00455
10,300	0.00098	0.00215	0.00296	0.00427	0.00493
9,000	0.00105	0.00230	0.00316	0.00456	0.00527
4,300	0.00152	0.00332	0.00457	0.00660	0.00762
2,000	0.00222	0.00487	0.00671	0.00968	0.01118
1,200	0.00287	0.00629	0.00866	0.01250	0.01443
800	0.00352	0.00771	0.01061	0.01531	0.01768
400	0.00497	0.01090	0.01500	0.02165	0.02500
200	0.00704	0.01541	0.02121	0.03062	0.03536
100	0.00995	0.02179	0.03000	0.04330	0.05000

The estimated populations for particular variables are provided in this report. The sample sizes can be estimated by multiplying the population by the weighting fraction, which is the sampling fraction corrected for non-response. The mean weighting fractions for selected groups are presented in Table E.3.

Example: In table 1.4A the population of engineering Ph.D.s is 52,900. Multiplying by 0.039, the approximate sample size is 2,063. The sampling error of a reported statistic (for instance, employed full-time, 95.4 percent) can be estimated by using the formula for s_p or consulting Table E.2 using rough approximations of the sample size and percentage in proportion form. In this case, $s_p = \left(\frac{0.954\ (1-0.954)}{2,063}\right)^{\frac{1}{2}} = 0.00458$, or

0.5 percent. Similarly, the value in the table opposite 2,000 for 0.95 is 0.00487. The reader can construct the desired confidence interval by multiplying the standard error by the appropriate coefficient: $\pm 1\, s_p$ will provide a 66.7 percent confidence interval, $\pm 2\, s_p$ approximately a 95 percent interval, etc.

Table E.3 Mean Weighting Fractions for Selected Groups

Science/Engineering		Humanities	
TOTAL IN U.S.	0.082	TOTAL IN U.S.	0.096
Men	0.063	Men	0.066
Women	0.215	Women	0.176
Minority	0.101	Minority	0.206
Mathematics	0.115	History	0.057
Computer Science	0.178	Art History	0.232
Physics/Astronomy	0.073	Music	0.124
Chemistry	0.068	Speech/Theater	0.126
Earth/Envir. Sci.	0.136	Philosophy	0.121
Engineering	0.039	Other Humanities	0.207
Agricultural Sci.	0.100	English/American lang. and Lit.	0.059
Medical Science	0.174	Classical Lang. and Lit.	0.236
Biological Sci.	0.111	Modern Lang. and Lit.	0.127
Psychology	0.077		
Social Science	0.058		

SAMPLING ERROR ESTIMATES FOR MEDIANS*

Sampling errors for median salary estimates presented in this report were computed not by strata but for all observations n, the number of sample cases in a particular subgroup reporting a salary. Comparisons

* The method for determining sampling errors of medians in this report was adapted from Morris H. Hansen, William N. Hurwitz, and William G. Madow, Sample Survey Methods and Theory, vol. 1 (John Wiley & Sons, Inc., New York, 1953), pp. 448-449.

of sampling errors for ratios and proportions (see above) indicate only minor differences between those calculated by strata and those that do not fully take into account sample design. The reader should interpret the confidence intervals as close approximations.

From the estimated population distribution, a statistic, m, is computed that is an estimator of M, the position measure. When m is a median (p_m), the proportion of cases in the derived distribution falling below the position measure equals 0.5. The sampling error of p_m is estimated by the formula $s_{p_m} = \left(\frac{p_m[1-p_m]}{n}\right)^{\frac{1}{2}}$. Two additional proportions are then computed: $p_1 = p_m - ks_{p_m}$

$$p_2 = p_m + ks_{p_m}$$

The confidence interval for the median is set by calcuating m_1 and m_2, the values below which p_1 and p_2 of the population distribution fall. The level of confidence is determined by k and will be 66.7 percent when k = 1, approximately 95 percent when k = 2, etc. Because the values of m_1 and m_2 depend on the variability of the distribution, the reader is cautioned that corresponding values for 2 standard errors are not necessarily twice those for 1 standard error. Median salaries were not reported when the values calculated for m_1 and m_2 for 1 standard error exceeded the median salary by $\pm$\$2,000.

Example: In Table 1.7 an estimated median annaul salary of \$30,900 is reported for Ph.D. psychologists. This was computed on the basis of 2,833 sample observations. Therefore, $s_{p_m} = \left(\frac{0.5(1-0.5)}{2,833}\right)^{\frac{1}{2}}$ = 0.0094. To construct a 95 percent confidence interval, compute p = 0.5 - 2[0.0094] = 0.4812 and p = 0.5 + 2[0.0094] = 0.5188, which round to 0.48 and 0.52. The values m_1 = \$30,500 and m_2 = \$31,500 are then calculated and provide the bounds of this interval. Table E.4 contains the 95 percent confidence intervals of median salary estimates for selected categories.

TABLE E.4 95 Percent Confidence Intervals of Median Salaries for Selected Categories (in thousands of dollars)

	Science/Engineering	Humanities
Total, Full-Time Employed Ph.D.s	34.5-35.1	26.1-26.5
Men	35.4-36.0	26.8-28.0
Women	26.8-27.3	22.8-23.7
Employed in Educ. Instit	30.9-31.4	26.4-26.7
Employed in Bus./Ind.	40.2-40.5	20.7-24.0
Employed in Federal Govt., Civ.	39.9-41.0	22.8-27.6*
Employed in State/Local Govt.	27.6-29.6	

Mathematics	31.3-32.3	History	26.4-28.1
Computer Sciences	34.2-36.5	Art History	23.7-26.5
Physics/Astronomy	36.5-37.3	Music	24.7-26.7
Chemistry	36.5-37.4	Speech/Theater	27.2-29.4
Earth/Envir. Sciences	34.1-35.8	Philosophy	25.1-27.0
Engineering	39.8-40.5	Other Humanities	25.8-29.0
Agricultural Sciences	32.5-33.9	Eng./Amer. Lang. & Lit.	25.7-26.7
Medical Sciences	35.7-37.5	Classical Lang. & Lit.	23.9-25.6
Biological Sciences	32.2-32.7	Modern Lang. & Lit.	24.8-25.9
Psychology	30.5-31.5		
Social Sciences	30.5-31.6		

*Employed in Federal Government (Civilian) or State/Local Government.

APPENDIX F

WEIGHTING PROCEDURE

Estimates in this report are based on weighted responses. The 2,369 individuals in the total sample of 65,391 who were known to be deceased or out of scope prior to the survey were excluded from the survey and weighted by their sample weight. The responses (39,547) received from the survey sample were assigned a response weight that is the product of the weight for nonresponse and the sample weight. Table F.1 shows the classification of the sample and the formulas used for calculating the weights.

Each stratum with fewer than two responses was merged with a similarly defined stratum in order to calculate sampling errors. Respondents in each stratum were assigned a weight equal to the integral part of the stratum's response weight, or the integral part plus one. Allocation of weights within a stratum was made at random so as to represent the stratum population. This technique avoids the necessity of rounding fractional estimates of totals.

For example, consider a stratum which contains 60 individuals of whom 15 were selected for the sample. One of the 15 is known to be deceased prior to the survey. This individual receives a sample weight, 60/15, or 4.0, and thus represents 4 individuals in the population. The number of survey sample cases in the stratum is 14. Of these 14 individuals, 10 responded. The average weight for the respondents in this stratum would be $[60/15]\ [14/10] = 5.6$. To obtain integer weights, 4 of the respondents, chosen at random, would each receive a weight of 5, thus representing 20 individuals in the population. The 6 remaining respondents would each receive a weight of 6, thus representing 36. Combined, the 10 respondents would represent 56 individuals in the stratum, who together with the 4 individuals who are estimated to be deceased represent the entire 60 individuals in the stratum.

Table F.1 Classification of Sample and Weighting for 1981 Survey of Doctorate Recipients

Group	Number in Sample		Type of Estimation Weight*
TOTAL SAMPLE		65,391	
EXCLUDED FROM SURVEY			
Known Deceased Prior to 1981 Survey**	1,848		Sample
Out of Scope			
Foreigns: Out of Scope, Based on 1973 Survey Responses+	58		Sample
Fields: Out of Scope, Based on 1973 Survey Responses#	271		Sample
Fields: Out of Scope, Based on 1975 Survey Responses#	86		Sample
Fields: Out of Scope, Based on 1977/1979 Survey Responses#	57		Sample
Fields: Out of Scope, Based on 1979 Survey Responses	49		Sample
Total		2,369	
SURVEY SAMPLE		63,022	
Unable to Mail, No Valid Address		6,511	
CONTACTED SAMPLE		56,511	
RESPONSES			
Good Responses		39,287	Response
Known Deceased as a Result of the 1981 Survey		260	Response
Total		39,547	

*The sample weights (Ws) and response weights (Wr) for each stratum were computed as follows:

$Ws_h = \frac{N_h}{n_h}$, where N_h and n_h are the respective population and sample sizes of the stratum (h).

$Wr_h = \frac{N_h}{n_h} \cdot \frac{\hat{n}_h}{r_h}$, where $\hat{n}_h$ is the number of survey sample cases in the stratum and r_h is the number of survey responses that stratum.

**Based on data obtained through 1973, 1975, 1977, or 1979 survey responses or through address searches.
+Based on responses that indicated individuals held Ph.D.s from foreign institutions, were foreign citizens, and resided in foreign countries
Based on responses that indicated individuals held doctorates in education or professional fields and were employed in nonscience/ nonengineering positions.

APPENDIX G

RESPONSE ANALYSES

METHODOLOGY

Of the 63,022 individuals in the 1981 SDR survey sample, 39,547 or 62.8 percent responded to the 1981 survey. The nonrespondents were classified into three groups: 1) those who declined to participate in the survey (N = 487); 2) those who were not mailed questionnaires because a valid address could not be obtained for them (N = 6,511); and 3) those who were presumably contacted but did not return their questionnaire (N = 16,477). To determine whether or not bias exists as a result of nonresponse, one would ideally survey a random sample of nonrespondents and compare their characteristics with those characteristics of the respondents. Such comparisons could possibly reveal important differences between the two groups, and thus alert users of the data to inaccuracies in the data. Nonresponse bias in the 1975 SDR was investigated in just this manner.*

Because the resources of both time and funds required to conduct a nonresponse bias survey are great, a different approach has been adopted for this report. Both demographic and employment characteristics are analyzed in the following text to determine whether any bias exists. The National Research Council's Survey of Earned Doctorates, an annual survey of the new Ph.D. recipients from U.S. universities, contains information on sex, year of Ph.D., and field of Ph.D. for the entire SDR sample. Data on age and citizenship are available for most of the FY1958-FY1980 Ph.D. recipients.

Employment status information is not available for the 1981 nonrespondent. The reliability of the response data may be evaluated, however, by comparing the characteristics of early respondents to late respondents.+ For these analyses, the respondents to the initial

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* Spisak, Andrew W. and Maxfield, Betty D., The Effects of Nonresponse Bias on the 1975 Survey of Doctoral Scientists and Engineers, Washington, D.C.: National Academy of Sciences, 1979.

+ For an example of this approach, see Commission on Human Resources, An Evaluation of the 1973 Survey of Doctoral Scientists and Engineers, Washington, D.C.: National Academy of Sciences, 1976.

mailing of March 1981 are compared with respondents to the follow-up mailings of May, August, and September. This latter group is a surrogate for the nonrespondents to the survey.

DEMOGRAPHIC CHARACTERISTICS

Sex

Differences between the respondents and nonrespondents were small for the variable, sex, and not subject to nonresponse bias.

Table G.1 CY1938-FY1980 Science/Engineering and Humanities Ph.D.s by Response Status and Sex

	Total (N)	Male %	Female %
Science/Engineering	372,503	87.7	12.3
Respondents	243,362	87.5	12.5
Nonrespondents	129,141	88.2	11.8
Humanities	79,508	73.0	27.0
Respondents	49,202	72.7	27.3
Nonrespondents	30,306	73.4	26.6

Year of Ph.D.

For both the science/engineering and humanities Ph.D.s differences between respondents and nonrespondents by calendar year of Ph.D. groupings were small. The differences in the 1970-1973 and 1974-1977 cohorts may be attributable to the fact that many of the addresses for the enriched FY1973-1976 Ph.D. sample proved to be incorrect. However, these cohorts were highly stratified, therefore, the differences should not be of concern.

Table G.2 Calendar Year of Doctorate of Science/Engineering and Humanities Ph.D.s by Response Status

	Total (N)	1938-49 %	1950-59 %	1960-69 %	1970-73 %	1974-77 %	1978-80+ %
Sci/Eng	372,503	5.9	14.3	29.5	19.9	18.9	11.6
Respondents	243,362	6.3	15.3	30.5	19.1	17.5	11.3
Nonrespondents	129,141	5.0	12.3	27.7	21.3	21.6	12.0
Humanities	79,508	5.7	12.5	26.2	22.4	22.1	11.2
Respondents	49,202	5.8	12.8	27.3	21.5	20.7	11.9
Nonrespondents	30,306	5.4	12.1	24.3	23.9	24.4	9.9

+Excludes Ph.D.s awarded in July-December 1980.

Field of Ph.D.

In general, differences between nonrespondents and respondents in all the science/engineering and humanities Ph.D. fields were small and not of concern. Although a slightly higher percentage of engineering and philosophy doctorates fell in the nonresponse category and a slightly higher percentage of biological science and music doctorates were in the response category, the differences were small.

Table G.3 Field of Doctorate of Science/Engineering and Humanities Ph.D.s by Response Status

Field of Doctorate	Total Survey Sample	Respondents	Nonrespondents
Total Science/Engineering (N)	372,503	243,362	129,141
Mathematics	5.3	5.3	5.3
Computer Sciences	0.6	0.6	0.7
Physics/Astronomy	8.3	8.2	8.6
Chemistry	13.3	13.6	12.8
Earth/Envir. Sciences	3.4	3.6	2.9
Engineering	14.8	13.6	17.1
Agricultural Sciences	4.7	4.8	4.6
Medical Sciences	3.1	3.1	2.9
Biological Sciences	18.0	18.8	16.6
Psychology	12.9	13.3	12.0
Social Sciences	15.7	15.2	16.4
Total Humanities (N)	79,508	49,202	30,306
History	26.0	27.4	23.9
Art History	2.7	2.7	2.7
Music	6.6	7.3	5.6
Speech/Theater	4.8	4.2	5.7
Philosophy	8.3	7.5	9.7
Other Humanities	2.8	2.7	3.0
English/American Lang. & Lit.	27.8	28.0	27.5
Classical Languages & Lit.	2.4	2.4	2.5
Modern Languages & Lit	18.4	17.8	19.5

Age and Citizenship

Data on age and citizenship are available for FY1958-FY1980 Ph.D. recipients only, or 83 percent of the science/engineering and

humanities sample. The median ages of science/engineering and humanities respondents and nonrespondents were essentially the same.

Table G.4 Median Age of FY1958-1980 Science/Engineering and Humanities Ph.D.s by Response Status

	Science/Engineering	Humanities
Total Sample	40	43
Respondents	41	43
Nonrespondents	40	43

Of the five demographic variables for which respondents and nonrespondents were compared, the most noteworthy differences were found for citizenship. While 94.4 percent of the science/engineering respondents were U.S. citizens, only 72.8 percent of the nonrespondents were U.S. citizens (Table G.5). The differences between respondents and nonrespondents were not as large for humanities Ph.D.s where 96.9 percent of the respondents were U.S. citizens compared with 89.3 percent of the nonrespondents.

Table G.5 Citizenship of FY1958-1980 Science, Engineering, and Humanities Ph.D.s by Response Status

	Total Population	U.S.	Foreign	No Report
Science/Engineering Total	309,987	86.7	12.0	1.2
Respondents	199,933	94.4	5.6	0.0
Nonrespondents	110,054	72.8	23.8	3.4
Humanities Total	67,510	93.9	4.7	1.3
Respondents	41,565	96.9	3.1	0.0
Nonrespondents	25,945	89.3	7.3	3.4

EMPLOYMENT CHARACTERISTICS

Employment Status

For scientists and engineers differences in employment status for early respondents and late respondents were small. In fact, the same proportion of early and late respondents indicated that they were unemployed and seeking employment (Table G.6A).

Table G.6A Employment Status of Science and Engineering Ph.D.s by Response Wave

1981 Employment Status	Total Response	Early Response	Late Response
Total Population	358,593	237,359	121,234
Employed Full-Time	88.5	88.7	88.2
Employed Part-Time	2.9	2.9	2.9
Postdoctoral Appointment	2.9	2.9	2.9
Not Employed	5.3	5.1	5.7
Seeking Employment	0.7	0.7	0.7
Not Seeking Employment	0.9	0.8	1.2
Retired	3.5	3.4	3.7
Other	0.1	0.1	0.1
No Report	0.4	0.4	0.3

Table G.6B Employment Status of Humanities Ph.D.s by Response Wave

1981 Employment Status	Total Response	Early Response	Late Response
Total Population	76,000	47,832	28,168
Employed Full-Time	83.6	84.4	82.1
Employed Part-Time	6.0	5.9	6.1
Postdoctoral Appointment	0.7	0.7	0.6
Not Employed	9.2	8.4	10.6
Seeking Employment	1.4	1.5	1.3
Not Seeking Employment	1.7	1.6	1.9
Retired	5.9	5.1	7.2
Other	0.2	0.2	0.1
No Report	0.6	0.6	0.6

The early responding humanities Ph.D.s tended to be employed full-time in slightly larger proportions than the late respondents (Table G.6B). Conversely, a slightly higher percentage of the late respondents were in the not employed categories. The differences, however, were not large enough to be of concern.

Field of Employment

There were no large differences between early and late science/engineering respondents by employment fields. A somewhat higher percentage of early respondents, however, reported employment in chemistry (11.1 percent) than did late respondents (9.2 percent).

Table G.7A Field of Employment of Science and Engineering Ph.D.s by Response Wave

1981 Field of Employment	Total Response	Early Response	Late Response
Total Employed	338,307	224,316	113,991
Mathematics	4.1	3.9	4.4
Computer Sciences	2.5	2.3	2.8
Physics/Astronomy	5.6	5.6	5.6
Chemistry	10.4	11.1	9.2
Earth/Envir. Sciences	4.5	4.9	3.7
Engineering	15.6	15.4	16.2
Agricultural Sciences	4.4	4.5	4.0
Medical Sciences	6.0	5.8	6.5
Biological Sciences	14.7	14.8	14.4
Psychology	11.4	11.3	11.5
Social Sciences	12.1	12.1	12.0
Nonscience/Nonengineering	5.3	4.8	6.2
No Report	3.5	3.5	3.5

While there are no important differences, a notably larger portion of early humanities respondents reported employment in history and English than did late respondents. A slightly larger portion of late respondents reported employment in philosophy, modern languages, and nonhumanities fields than did initial respondents.

Table G.7B Field of Employment of Humanities Ph.D.s by Response Wave

1981 Field of Employment	Total Response	Early Response	Late Response
Total Employed	68,594	43,559	25,035
History	18.9	19.9	17.3
Art History	2.6	2.8	2.1
Music	6.1	6.1	6.1
Speech/Theater	2.9	2.9	2.8
Philosophy	5.9	5.5	6.6
Other Humanities	4.3	4.2	4.4
English/American Lang. & Lit.	21.2	22.0	19.8
Classical Languages & Lit.	1.6	1.7	1.4
Modern Languages & Literature	14.0	13.1	15.6
Nonhumanities	17.1	16.4	18.2
No Report	5.5	5.3	5.7

Type of Employer

Although the differences were small, science/engineering Ph.D.s who responded early were more likely to be employed by the federal government and less likely to be employed by business/industry than those who responded later. Among humanists a slightly higher percentage of the early respondents than the late respondents were employed by four-year colleges, universities or medical schools (Table G.8B). Conversely, a slightly higher percentage of the late respondents reported employment in business/industry compared with the early respondents.

Table G.8A Type of Employer of Science and Engineering Ph.D.s by Response Wave

1981 Type of Employer	Total Response	Early Response	Late Response
Employed Population*	327,793	217,356	110,437
Educational Institution	53.4	53.0	54.2
4-Year Coll/Univ/Med Sch.	51.2	50.8	51.9
2-Year College	1.4	1.4	1.5
Elem/Secondary School	0.8	0.8	0.8
Business/Industry+	29.8	29.2	31.0
U.S. Government	8.0	8.6	6.8
State/Local Government	1.9	2.0	1.6
Hospital/Clinic	2.9	2.9	2.9
Other Non-Profit Organization	3.2	3.3	2.9
Other	0.7	0.8	0.6
No Report	0.2	0.2	0.2

*Excludes postdoctoral appointees
+Includes self-employed

Table G.8B Type of Employer of Humanities Ph.D.s by Response Wave

1981 Type of Employer	Total Response	Early Response	Late Response
Employed Population*	68,060	43,203	24,857
Educational Institution	85.4	86.0	84.3
4-Year Coll/Univ/Med Sch.	77.8	78.7	76.1
2-Year College	4.9	5.0	4.7
Elem/Secondary School	2.7	2.3	3.5
Business/Industry+	6.7	6.2	7.5
U.S. Government	2.0	2.1	1.9
State/Local Government	1.5	1.6	1.5
Hospital/Clinic	0.1	0.1	0.3
Other Non-Profit Organization	3.3	3.0	3.9
Other	0.3	0.3	0.2
No Report	0.6	0.7	0.4

*Excludes postdoctoral appointees +Includes self-employed

Primary Work Activity

Slightly higher percentages of early science/engineering respondents were engaged in research and development and less in teaching compared to late respondents (Table G.9A).

Table G.9A Primary Work Activity of Science and Engineering Ph.D.s by Response Wave

1981 Primary Work Activity	Total Response	Early Response	Late Response
Employed Population*	327,793	217,356	110,437
Teaching	31.4	30.8	32.4
Research/Development/Design	33.6	34.5	31.8
Management/Administration	18.1	18.0	18.2
of Research and Development	9.9	9.8	10.1
of Education Programs	4.1	4.3	3.7
of Other Activities	4.1	3.9	4.3
Consulting/Professional Serv.	10.4	10.2	10.7
Writing/Editing	1.0	1.0	1.0
Marketing/Production/Inspection	1.9	1.8	2.0
Other	2.6	2.6	2.5
No Report	1.2	1.1	1.3

*Excludes postdoctoral appointees

A slightly higher percentage of early respondents holding humanities Ph.D.s cited teaching as their primary work activity (Table G.9B) compared to late respondents.

Table G.9B Primary Work Activity of Humanities Ph.D.s by Response Wave

1981 Primary Work Activity	Total Response	Early Response	Late Response
Employed Population*	68,060	43,203	24,857
Teaching	69.7	70.4	68.6
Research and Development	3.8	3.4	4.6
Consulting/Professional Services	2.8	2.8	3.0
Management/Administration	11.0	11.0	11.1
Writing/Editing	4.2	4.3	4.0
Cultural Resources	0.4	0.4	0.4
Archival Work	0.5	0.5	0.5
Curatorial Work	0.4	0.5	0.3
Performing Arts	1.0	0.8	1.2
Other	3.8	4.0	3.5
No Report	2.3	1.9	2.8

*Excludes postdoctoral appointees

Annual Salary

Early and late science/engineering respondents earned substantially the same salaries, $34,800 and $34,900, respectively (Table G.10). Humanities Ph.D.s who responded early had a somewhat higher median annual salary than late respondents, $26,400 and $26,100, respectively.

Table G.10 Median Annual Salary of Science/Engineering and Humanities Ph.D.s by Response Wave (In Thousands of Dollars)

	Total Response	Early Response	Late Response
Science/Engineering	$34.8	$34.8	$34.9
Humanities	$26.3	$26.4	$26.1

CONCLUSIONS

While there are some notable differences between respondents and nonrespondents, and between early and late respondents, only in the case of citizenship was there an important difference. The differences for the other variables were generally well within the limits of the expected sampling error.*

In the case of the variable citizenship, response rates for U.S. citizens were markedly higher than response rates for foreign citizens. This difference was expected. The analysis of the effect of nonresponse bias on the 1975 SDR found similar differences in the response rates for U.S. citizens and foreign citizens.+ As a result of that study, citizenship was added as an additional stratifying variable for the selection of the 1979 and 1981 survey samples. Separate population weights were calculated for U.S. citizens and

* Detailed discussion of the sampling error are found in Appendix E.
+ Spisak and Maxfield, Effects of Nonresponse Bias.

foreign citizens in an attempt to compensate for the differences that occur in their response rates. *

The data presented in the preceding tables show, though not conclusively, that population estimates derived from the 1981 SDR were not seriously affected by nonresponse bias.

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* Detailed discussion of the weighting procedures used to calculate population estimates are found in Appendix D.

APPENDIX H

FINE FIELDS OF EMPLOYMENT

FINE FIELDS OF EMPLOYMENT OF DOCTORAL SCIENTISTS AND ENGINEERS IN THE UNITED STATES, 1981

Fine Field of Employment	Est. N
Total Population	338,307
Mathematics Total	13,878
Algebra	1,234
Analysis & Functional Anal.	1,780
Geometry	409
Logic	125
Number Theory	347
Probability	379
Math Statistics	2,349
Topology	797
Operations Research	930
Applied Mathematics	2,096
Combinatorics & Fin. Math	378
Physical Mathematics	180
Mathematics General	2,469
Mathematics, Other	405
Computer Sciences Total	8,324
Theory	471
Software Systems	5,276
Hardware Systems	395
Intelligent Systems	503
Computer Sciences, Other	1,679
Physics/Astronomy Total	18,974
Astronomy	950
Astrophysics	1,419
Atomic & Nuclear Physics	1,132
Electromagnetism	526
Mechanics	55
Acoustics	521
Fluids	376
Plasma Physics	1,360
Optics	1,125
Thermal Physics	297
Elementary Paricles	1,703
Nuclear Structure	974
Solid State	3,131
Physics, General	2,985
Physics, Other	2,420
Chemistry, Total	38,108
Analytical Chemistry	4,908
Inorganic Chemistry	1,929
Synth. Inorg. & Organomet.	760
Organic Chemistry	7,246
Synth. Organ. & Nat. Prod.	1,793
Nuclear Chemistry	226
Physical Chemistry	4,097
Quantum Chemistry	158
Theoretical Chemistry	244
Structural Chemistry	273
Agricultural & Food	698
Thermodyn & Mater'l. Prop.	302
Pharmaceutical Chemistry	1,768
Polymers	5,025
Biochemistry	2,809
Chemical Dynamics	195
Chemistry, General	2,502
Chemistry, Other	3,175

1981 Fine Field of Employment	Est. N
Earth, Environmental & Marine Sciences Total	15,244
Mineralogy, Petrology	902
Geochemistry	789
Stratigraphy, Sedimen.	739
Paleontology	539
Structural Geology	364
Geophysics (Solid Earth)	1,469
Geomorph., Glacial Geol.	287
Hydrology	763
Oceanography	920
Meteorology	7
Atmospheric Chem. & Phys.	919
Atmospheric Dynamics	389
Atmospheric Sci., Other	744
Environmental Sci., General	1,448
Environmental Sci., Other	1,217
Applied Geology, Etc.	1,348
Fuel Tech. & Petrol Engr.	304
Marine Sciences, Other	818
Earth Sciences, General	567
Earth Sciences, Other	711
Engineering Total	52,893
Aero- & Astronautical	2,240
Agricultural Engineering	891
Biomedical Engineering	1,469
Civil Engineering	3,639
Chemical Engineering	6,368
Ceramic Engineering	664
Computer Engineering	1,180
Electrical Engineering	4,607
Electronics Engineering	4,175
Industrial/Manufacturing	936
Nuclear Engineering	1,969
Engineering Mechanics	1,838
Engineering Physics	1,209
Mechanical Engineering	4,973
Metallurgy & Phys. Met.	2,271
Systems Design & Sys. Sci.	3,504
Operations Research, Sys.	131
Operations Reseach	1,469
Fuel Tech. & Petrol. Engr.	1,007
Sanitary/Environmental	1,866
Mining Engineering	151
Materials Sci. Engr.	2,756
Engineering, General	1,100
Engineering, Other	2,480
Agricultural Sciences Total	14,718
Agronomy	1,702
Agricultural Economics	2,130
Animal Husbandry	489
Food Science & Tech.	1,171
Fish & Wildlife	1,157
Forestry	1,244
Horticulture	1,318
Soils & Soil Science	1,085
Animal Sciences	1,524
Phytopathology	1,189
Agricultural Sci., General	286
Agricultural Sci., Other	1,423

FINE FIELDS OF EMPLOYMENT OF DOCTORAL SCIENTISTS AND ENGINEERS IN THE UNITED STATES, 1981

Fine Field of Employment	Est. N
Medical Sciences Total	20,406
Medicine & Surgery	3,280
Public Health	1,675
Veterinary Medicine	909
Hospital Administration	328
Nursing	800
Parisitology	416
Environmental Health	749
Pathology	1,276
Pharmacology	3,561
Pharmacy	1,079
Medical Sciences, General	1,054
Medical Sciences, Other	5,279
Biological Sciences Total	46,806
Biochemistry	7,171
Biophysics	1,394
Biomathematics	141
Biometrics, Biostatistics	1,210
Anatomy	2,283
Cytology	915
Embryology	407
Immunology	2,133
Botany	2,031
Ecology	2,157
Hydrobiology	277
Microbiol. & Bacteriol.	4,764
Physiology (Animal)	4,359
Physiology (Plant)	1,159
Zoology	1,773
Genetics	2,307
Entomology	2,350
Molecular Biology	3,422
Food Science & Technology	507
Behavior/Ethology	518
Nutrition & Dietetics	752
Biological Sciences, General	2,581
Biological Sciences, Other	2,195
Psychology Total	38,558
Clinical Psychology	18,395
Counseling & Guidance	1,677
Developmental & Gerontol.	2,003
Educational Psychology	1,175
School Psychology	1,404
Experimental Psychology	3,369
Comparative Psychology	300
Physiological Psychology	1,247
Industrial & Personnel	1,999
Personality Psychology	383
Psychometrics	455
Social Psychology	1,722
Psychology, General	1,383
Psychology, Other	3,046
Social Sciences Total	40,877
Anthropology	2,462
Archeology	882
Communications	2,532
Linguistics	1,085
Sociology	6,532
Economics	10,248

1981 Fine Field of Employment	Est. N
Econometrics	655
Social Statistics	697
Geography	2,214
Area Studies	228
Political Sci., Pub. Admin.	101
Political Science	6,297
Public Administration	1,909
International Relations	1,005
Criminology & Crim. Justice	1,079
Urban & Regional Plan.	882
History & Phil. of Sci.	348
Social Sciences, General	521
Social Sciences, Other	1,200
Arts & Humanities Total	740
History & Crit. of Art	94
American History	67
History, Other	148
American Studies	9
Theater & Theater Crit.	68
Music	31
Speech as a Dramatic Art	9
Philosophy	55
Comparative Literature	3
Humanities, General	33
Humanities, Other	30
Library & Archival Sci.	193
Languages & Literature Total	628
American	7
English	284
German	39
Russian	35
French	32
Spanish & Portuguese	100
Italian	5
Classical	6
Other Languages	120
Education & Other Professional Fields Total	16,418
Education	5,467
Applied Art	73
Religion	533
Theology	145
Business Administration	5,424
Home Economics	109
Journalism	248
Speech & Hearing Science	105
Law, Jurisprudence	711
Social Work	307
Prof. Field Other	1,451
Other Fields	1,845
No Report	11,735

FINE FIELDS OF EMPLOYMENT OF PH.D.S IN THE HUMANITIES
AND SELECTED SOCIAL SCIENCES IN THE UNITED STATES, 1981

1981 Fine Field of Employment	Est. N
Total Employed	68,594
Mathematics Total	64
Computer Sciences Total	604
Theory	18
Software Systems	399
Intelligent Systems	21
Computer Sci., Other	166
Physics/Astronomy Total	26
Chemistry Total	5
Earth, Envir. & Mar. Sci. Total	47
Engineering Total	188
Agricultural Sciences Total	19
Medical Sciences Total	211
Biological Sciences Total	5
Psychology Total	272
Clinical Psychology	107
Counseling & Guidance	129
Educational Psychology	2
Industrial & Personnel	16
Personality Psychology	4
Psychology, Other	14
Social Sciences Total	2,574
Anthropology	26
Archeology	21
Communications	658
Linguistics	124
Sociology	28
Economics	74
Econometrics	4
Geography	2
Area Studies	137
Political Science	220
Public Administration	310
International Relations	106
Criminology & Crim. Justice	45
Urban and Regional Plan	127
History & Phil. of Sci.	249
Social Sciences, General	189
Social Sciences, Other	254

1981 Fine Field of Employment	Est. N
Arts & Humanities Total	28,744
History & Crit. of Art	1,752
American History	5,786
European History	3,599
History, Other	2,964
American Studies	643
Theater & Theater Crit.	1,377
Music	4,175
Speech as a Dramatic Art	604
Philosophy	4,044
Humanities, General	846
Comparative Literature	855
Humanities, Other	617
Library & Archival Sci.	1,482
Languages & Literature Total	24,378
American	3,523
English	11,019
German	1,792
Russian	738
French	2,399
Spanish & Portuguese	2,831
Italian	231
Classical	1,092
Other Languages	753
Education & Other Professional Fields Total	7,699
Education	3,156
Journalism	410
Applied Art	61
Religion	588
Theology	243
Business Administration	990
Home Economics	1
Journalism	410
Speech & Hearing science	143
Law, Jurisprudence	433
Social Work	84
Professional Field, Other	496
Other Fields	1,094
No Report	3,758

APPENDIX I

CHANGES IN SPEECH CLASSIFICATION

In 1981, survey sample members were asked to give their birthdate and Ph.D. field so as to verify to the satisfaction of the NRC staff that the individuals completing the survey forms were in fact the individuals that were selected for the survey sample. This method differed from that used in previous surveys, where individuals were asked to merely verify preprinted demographic data.

Computer editing of field of doctorate indicated that the self-identified Ph.D. fields given on the 1981 questionnaire were, for the most part, within the same broad field of doctorate which was on record. As a further check, population estimates published in the 1979 Profile were compared to revised field of doctorate estimates from the 1981 responses. For all humanities Ph.D. fields, except speech/theater, the revised estimates were within the 95 percent confidence intervals of the published estimates.

The revised estimate of speech/theater Ph.D.s in the United States in 1981, however, was approximately 800 less than that reported in the 1979 Profile (3,300 compared to 4,100). This loss may be attributed to individuals who had previously been identified as Ph.D.s in "speech as a dramatic art" (code 831) now being identified as Ph.D.s in the nonhumanities fields of "communications" (code 708) or "speech and hearing sciences" (code 885).

Because of changes in the field definition of "speech" over the years, these apparent switches are not surprising. Code 831 was originally specified as "speech". In FY1962, "dramatic arts" was added. In FY1969, the field name was changed to "speech as a dramatic art" and other related fields were added, i.e., "communications" (code 708) and "speech and hearing sciences" (code 885). Individuals who changed their field on the 1981 survey may have been limited in the field specialties available at the time they received their doctorate degree, and, given no preprinted information, selected from the current list the field they considered the closest to their Ph.D. specialty.

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